

Bulletin 85

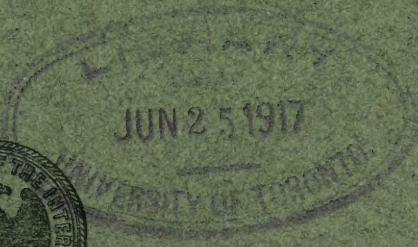
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

JOSEPH A. HOLMES, DIRECTOR

ANALYSES OF MINE AND CAR SAMPLES
OF COAL COLLECTED IN THE FISCAL
YEARS 1911 TO 1913

BY

ENGINEERING ARNO C. FIELDNER, HOWARD I. SMITH, ALBERT H. FAY,
and SAMUEL SANFORD
ENGINE STORAGE



WASHINGTON
GOVERNMENT PRINTING OFFICE
1914



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ANALYSES OF MINE AND CAR SAMPLES OF COAL COLLECTED IN THE FISCAL YEARS 1911 TO 1913.

By ARNO C. FIELDNER, HOWARD I. SMITH, ALBERT H. FAY, and
SAMUEL SANFORD.

SAMPLING AND ANALYTICAL METHODS.

By ARNO C. FIELDNER.

INTRODUCTION.

In connection with investigations relating to fuels belonging to or for the use of the United States Government, the causes of accidents in coal mines, the geologic relations of coal beds, and the character of the coal and the value of the fuel in the public lands, many mine samples of coal are analyzed each year in the laboratories of the Bureau of Mines. The systematic collection and analysis of coal samples in connection with investigations of fuels was begun in 1904 at the Government fuel-testing plant at the Louisiana Purchase Exposition, and was under the direction of the United States Geological Survey for six years. Descriptions of the coal samples collected in connection with these investigations between the beginning of this work, July 1, 1904, and the transfer of the fuel-testing and mine-accident investigations to the Bureau of Mines, July 1, 1910, were compiled and published in Bureau of Mines Bulletin 22.^a

The present bulletin presents analyses and descriptions of samples collected during the fiscal years 1911 to 1913. In order that the material in this bulletin may be used to supplement that presented in Bulletin 22, the same plan of geographical classification has been followed, the analyses and descriptions of the samples being grouped in alphabetical order according to the State, county, and town near which the mines or prospects sampled are situated.

^a Lord, N. W., and others: Analyses of coals in the United States, with descriptions of mine and field samples collected between July 1, 1904, and June 30, 1910. Bull. 22, Bureau of Mines, 1912. 1,200 pp. (in two parts).

ACKNOWLEDGMENTS.

Special acknowledgment is due to G. O. Smith, Director of the United States Geological Survey, and to M. R. Campbell, geologist in charge of the economic geology of fuels, for furnishing field descriptions of those samples collected by the geologists of the survey, and for revising the nomenclature of coal beds and geologic formations.

The mine samples from Missouri were collected under the direction of H. A. Buehler, director of the Missouri Geological Survey.

The collection of samples by the fuel-inspection service of the Bureau of Mines was under the direction of G. S. Pope, engineer. Samples designated by the letter W preceding the laboratory number were analyzed in the Washington laboratory of the bureau under the direction of J. D. Davis, chemist.

The collection of mine samples and the gathering of mine data by the field engineers of the bureau were done under the direction of G. S. Rice, chief mining engineer of the bureau, who has also reviewed the descriptions and comments on the methods of field sampling. The descriptions of the mines and the sections of the coal beds were compiled by H. I. Smith and A. H. Fay, mining engineers, and Samuel Sanford, engineer. The chemical analyses were made under the direction of A. C. Fieldner, chemist, who was assisted by D. I. Brown, assistant chemist; C. K. Glycart, A. E. Hall, Harold Isenberg, W. A. Mueller, G. G. Oberfell, F. D. Osgood, G. E. Postma, W. A. Selvig, C. A. Taylor, G. G. Taylor, G. E. Webster, A. M. Wedd, and H. G. Woodward, junior chemists; W. E. Surbled, laboratory assistant; Max Hecht and Morris Block, laboratory helpers. The junior chemists and laboratory helpers were engaged on coal analyses for varying lengths of time, ranging from one month to two years. The computing and the tabulating of the analyses at the Pittsburgh laboratory were under the direction of Lauson Stone, engineer.

COLLECTION OF SAMPLES.

Samples designated by the letter A in the table of analyses were collected by representatives of the Bureau of Mines, in connection with the investigation of fuels belonging to, or for the use of, the Government; and the investigation of accidents in coal mines. Under this designation are also included a number of samples collected by the Missouri Geological Survey in cooperation with the Bureau of Mines.

The samples designated by the letter B in the table of analyses were collected by the United States Geological Survey in connection with the study of the geologic relations of coal beds and the classification of public lands.

METHOD OF MINE SAMPLING FOLLOWED BY BUREAU OF MINES.

The method of collecting mine samples that is practiced by the Bureau of Mines has been described in detail in a previous publication.^a It involves selecting a representative face of the bed to be sampled; cleaning the face; making a cut across it from roof to floor, and rejecting or including impurities in this cut according to a definite plan as they are included or excluded in mining operations; reducing this gross sample, by crushing and quartering, to about 3 pounds; and immediately sealing the 3-pound sample in an air-tight container for shipment to the laboratory.

COLLECTION OF CAR SAMPLES.

The carload lots of coal shipped to Pittsburgh for test were sampled by taking definite quantities of coal at regular intervals from a car as it was unloaded, and by reducing to convenient size (about 50 pounds) the gross sample thus obtained.

METHOD OF SAMPLING FOLLOWED BY THE UNITED STATES GEOLOGICAL SURVEY.

In collecting mine samples the Geological Survey follows essentially the same method of sampling as that used by the Bureau of Mines. However, in sampling outcrops and prospect holes or country banks when mining is not in progress, the geologist can not imitate the miner in rejecting or including impurities in the sample, and hence the sample from the cut across the bed includes all partings or binders less than three-eighths of an inch thick and every concretion or "sulphur ball" having a maximum diameter of less than 2 inches and a thickness of less than one-half inch. All other impurities in the bed are excluded from the sample. Obviously an arbitrary and uniform system of rejecting impurities is necessary for sampling outcrops, prospects, and undeveloped mines.

RELATION OF MINE SAMPLES TO COMMERCIAL SHIPMENTS.

In making statements, on the basis of the analyses of mine samples, in regard to the quality of coal shipped from a mine due allowance must be made for the larger proportion of impurities that may be included in the commercial operation of the mine. It is difficult to take a mine sample in which impurities are rejected in exactly the same manner as is done by the miner. The practice of different

^a Holmes, J. A., The sampling of coal in the mine: Technical Paper 1, Bureau of Mines, 1911, 18 pp.

miners will vary, especially if rigid inspection at the tippie is not enforced. In some mines, for instance, where the coal bed has friable partings or has a soft, flaky roof or floor, the inclusion of some foreign matter is unavoidable. Hence the analysis of the mine sample usually indicates a better grade of coal, as regards ash content and heating value, than the actual commercial shipments, and for this reason the mine sample should be considered as representing the coal that can only be produced under the most favorable conditions of mining and preparation.

In commercial shipments that are sampled at their destination the moisture content may be either more or less than that in the mine samples, the relative proportions depending on the amount of bed moisture, the size of the coal, and the weather conditions during transit.

Coals containing 5 per cent or more of moisture tend to lose moisture while in transit. Slack coal usually contains more moisture than the mine sample. Low-moisture coals shipped in open cars may gain or lose moisture, depending on weather conditions.^a

The calorific value, referred to moisture-free and ash-free coal, of samples taken from shipments at destination, tends to be slightly lower than that of the fresh mine samples from the same mine. The deterioration is caused mainly by the freshly exposed surfaces of coal absorbing oxygen from the air. The rate of deterioration varies with the different types of coal and depends on a number of factors, chief of which are: (1) Size of coal, (2) proportion of surface exposed to circulating air, (3) duration of exposure, (4) temperature and humidity.

It is therefore difficult to assign any definite values for deterioration of coal while in transit.^b A number of mine and car samples tested by the United States Geological Survey and the Bureau of Mines showed the following average losses:

Average loss in moisture-free and ash-free calorific value of car sample as compared with that of mine sample.

Kind of coal.	Per cent.
Semibituminous, New River and Pocahontas.....	0.1
Bituminous, Appalachian field.....	.3
Bituminous, Illinois, Indiana, and Missouri.....	.8
Subbituminous and lignite.....	1.3

^a For a comparison of the moisture, ash, and sulphur contents of mine and car samples tested at the United States fuel-testing plant, St. Louis, Mo., see Burrows, J. S., The importance of uniform and systematic coal-mine sampling: U. S. Geol. Survey Bull. 316, 1907, pp. 490-560. For a discussion of moisture in coal deliveries, see Pope, G. S., Sampling coal deliveries: Bull. 63, Bureau of Mines, 1913, p. 12.

^b For data on deterioration of coal see Porter, H. C., and Ovitz, F. K., Deterioration and spontaneous combustion of coal in storage, a preliminary report: Tech. Paper 16, Bureau of Mines, 1912, 14 pp.; The escape of gas from coal: Tech. Paper 2, Bureau of Mines, 1911, 14 pp., 1 fig.; Parr, S. W., and Wheeler, W. F., The weathering of coal: University of Illinois Eng. Exp. Station Bull. 38, 1909.

ANALYTICAL METHODS.

The methods of analysis and the details of apparatus used by the Bureau of Mines in analyzing coal are fully described in Bulletin 22 ^a and Technical Paper 8 ^b of the Bureau of Mines. They are briefly summarized here, certain changes in minor details, which are fully discussed in Technical Paper 76, ^c being described.

PREPARATION OF LABORATORY SAMPLES.

Immediately after the sealed 3-pound can in which the sample is received at the laboratory has been opened, the contents are transferred to a weighed sheet-metal pan, spread out to a depth of 1 inch, and at once weighed. The pan containing the sample is placed in a large drying oven in which a temperature of 30° to 35° C. is maintained. Through this oven a current of warm air is made to flow by means of an ordinary desk fan mounted on top of the oven, and the sample is dried until the loss in weight between two successive weighings, made 6 to 12 hours apart, does not exceed 0.5 per cent. The total loss of weight is reported as "air-drying loss."

Immediately after the last weighing has been made the entire sample is quickly pulverized to 10-mesh size by being passed through a roll crusher. After having been mixed, the 10-mesh material is reduced with a riffle sampler to 500 grams. This 500-gram part is at once transferred to the porcelain jar of an Abbe ball mill, which is sealed air-tight and rotated at the rate of 60 revolutions per minute until the coal is pulverized to 60-mesh size.

This 60-mesh coal is emptied on a one-half-inch screen, which is vigorously shaken to detach the coal from the pebbles. The sample (approximately 500 grams) is then reduced to the final laboratory sample of approximately 60 grams by successive halvings with a small riffle sampler. The final sample is put through the 60-mesh sieve and at once transferred to a 4-ounce wide-mouthed bottle, which is securely closed with a well-fitting rubber stopper. Any particles of coarse material remaining on the sieve are carefully rubbed down to 60-mesh size on a bucking board and are thoroughly mixed with the sample in the bottle.

This air-dried sample is used in all analytical determinations.

^a Lord, N. W., and others, Analyses of coals in the United States, with descriptions of mine and field samples collected between July 1, 1904, and June 30, 1910: Bull. 22, Bureau of Mines, 1913, pp. 10-26.

^b Stanton, F. M., and Fieldner, A. C., Methods of analyzing coal and coke. Tech. Paper 8, Bureau of Mines, 1913, 42 pp.

^c Fieldner, A. C., Notes on the sampling and analysis of coal: Tech. Paper 76, Bureau of Mines, 1914, pp. 14-58.

DETERMINATION OF MOISTURE.

The residual moisture in the air-dried sample is determined by heating 1 gram in a shallow porcelain capsule, seven-eighths of an inch deep and $1\frac{3}{4}$ inches in diameter, for one hour at 105°C . in a constant-temperature oven through which a current of dry preheated air is rapidly passing. The air is dried by being passed through concentrated sulphuric acid. The covered capsule is cooled in a desiccator over sulphuric acid and then weighed. The loss in weight is called "moisture at 105° " in the air-dried coal.

ASH DETERMINATION.

The same sample is used for determining ash as was previously used for determining moisture. A porcelain capsule containing the sample is placed in a cool muffle and the temperature is gradually raised to approximately 750°C . The ignition in the muffle is con-

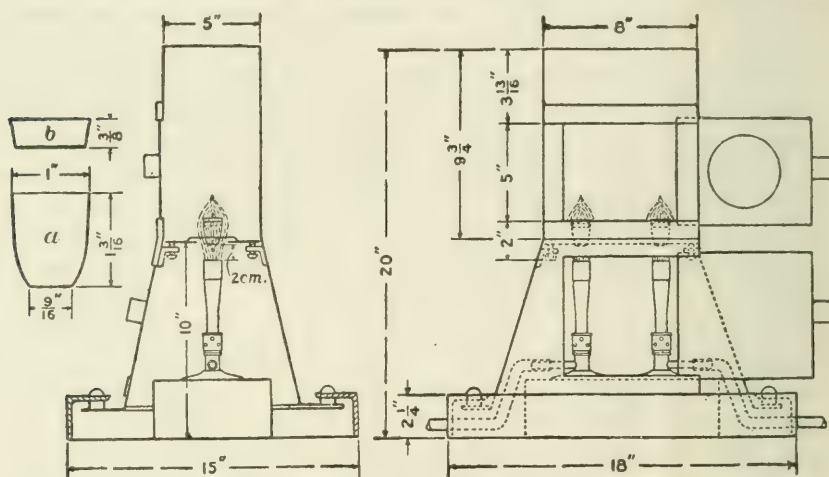


FIGURE 1.—Apparatus for determining volatile matter.

tinued, with occasional stirring of the ash, until all particles of carbon have disappeared. After the capsule containing the ash has been cooled in a desiccator it is weighed and ignition is repeated until constant weight (0.0005 gram or less) has been attained.

The ash content as determined by this method represents the ignited mineral residue or "uncorrected ash."

DETERMINATION OF VOLATILE MATTER.

APPARATUS.

A 1-gram sample of the fine (60-mesh) coal is weighed into a bright, well-burnished, 10-gram (10 c. c.) platinum crucible (*a*, fig. 1), with a close-fitting capsule cover, *b*. The crucible and contents are heated

to a temperature of 950°C . upon a platinum or nichrome triangle for seven minutes in the full flame of a No. 3 Meker burner. The gas orifice of the burner is adjusted to give a free-burning flame from 16 to 18 cm. high. The crucible should be so placed in the triangle that its bottom is 2 cm. above the top of the burner. To protect the crucible from the effects of drafts it is put in a sheet-iron chimney of special design. The maximum temperature, as measured by a thermocouple whose hot junction is buried in the coal and in contact with the inside surface of the bottom, should be 950°C . After being heated exactly seven minutes, the crucible is cooled and weighed. The loss in weight minus the weight of moisture determined at 105°C . times 100 equals the percentage of volatile matter.

MODIFIED METHOD FOR LIGNITES AND SUBBITUMINOUS COALS.

Lignites and coals high in moisture are heated at a low temperature until all the moisture is driven out in order to avoid mechanical losses from material thrown out of the crucible by the rapid escape of steam and volatile matter.^a This preliminary heating for four to six minutes is followed by the usual 7-minute application of the full flame.

It should be clearly understood that the volatile matter does not represent any definite compound in the coal. The method of determination is wholly conventional, and any variation in temperature or rate of heating will change the amount of volatile matter determined.

USE OF THE ELECTRIC FURNACE.

Since February 26, 1913, all volatile-matter determinations at the bureau's laboratory in Pittsburgh have been made in specially designed electric furnaces of the vertical type (fig. 2). Two of these furnaces are connected in series and are controlled by a single rheostat. A current of 8 to 9 amperes is required to maintain the temperature of each furnace at 950°C . Under these conditions the drop in potential across the two furnaces is 60 volts. The life of the heating element under daily operation has been six to eight months. Each furnace contains a platinum-platinum-rhodium thermocouple that is connected to a millivoltmeter through a double-pole, double-throw switch. The position of the hot junction in each furnace is so adjusted that the direct reading of the temperature scale of the millivoltmeter is the same as the maximum temperature attained inside the crucible as determined by another standardized couple whose hot junction is in contact with the bottom of the interior of the

^a Lord, N. W.: Experimental work conducted in the chemical laboratory of the United States fuel-testing plant at St. Louis, Mo. U. S. Geol. Survey Bull. 323 (reprinted as Bull. 28, Bureau of Mines), pp. 6-7.

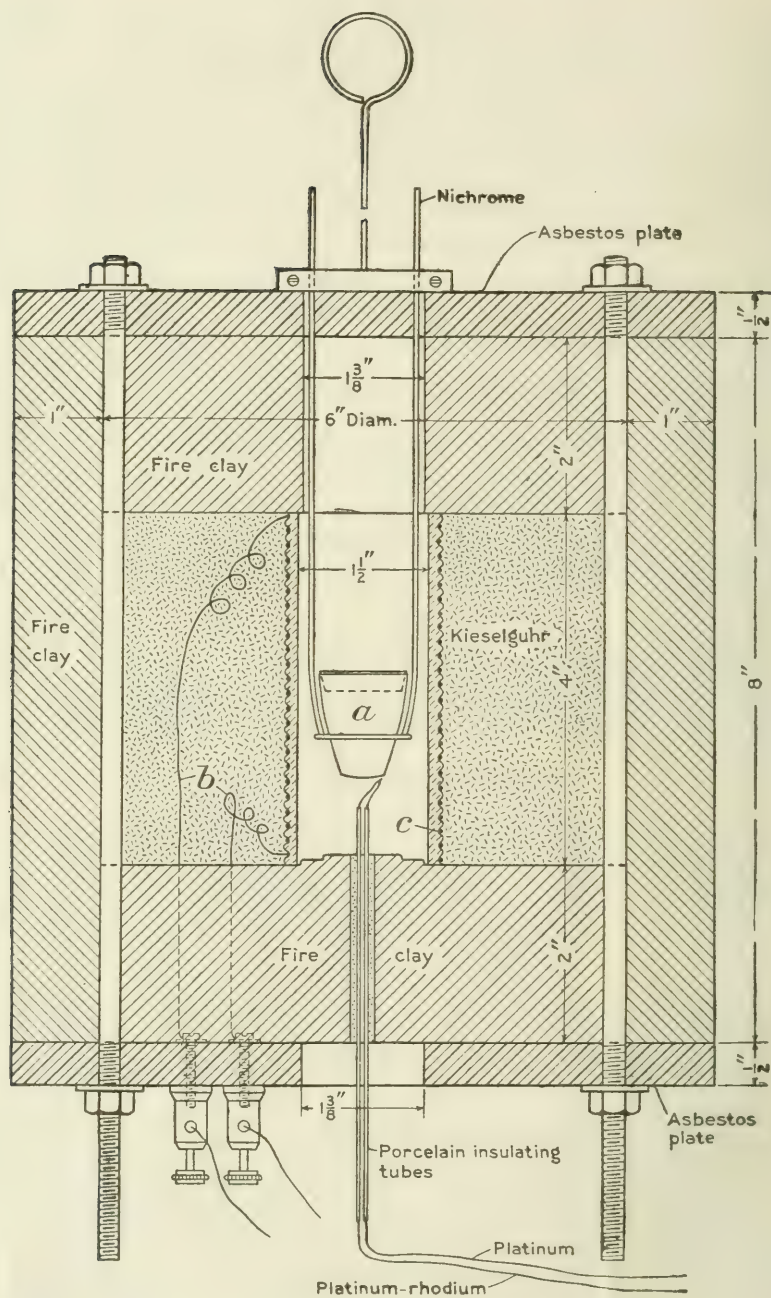


FIGURE 2.—Electric furnace for volatile-matter determination.

crucible. In making this comparison a nickel cover perforated for admitting the thermocouple leads is substituted for the usual platinum cover of the crucible. To avoid possible contamination of the thermocouple, 1 gram of ignited silica or alumina is used instead of coal.

DETERMINATION OF FIXED CARBON.

The fixed carbon content of the sample is determined by calculation—by subtracting the sum of the percentages of moisture, ash, and volatile matter from 100.

SULPHUR DETERMINATION.

Sulphur is determined by the Eschka method. A 1.3737-gram part of the air-dried coal is mixed with 6 grams of Eschka mixture in a No. 1 porcelain crucible and gradually heated in a muffle, with free access of air, until all the carbon has been consumed. The sulphur is extracted with hot water, completely oxidized to sulphate with bromine water, and precipitated and weighed as barium sulphate.

DETERMINATION OF CARBON AND HYDROGEN.

Carbon and hydrogen are determined by the usual method of combustion in a current of oxygen. A 0.2-gram part of the air-dried coal is burned in a 25-burner combustion furnace of the Glazer type or in an electrically heated furnace of the Heraeus type. Complete oxidation is insured by passing the products of combustion over red-hot copper oxide. A layer of lead chromate, following the copper oxide, removes the sulphur. The water and carbon dioxide are absorbed and weighed in calcium chloride and potassium hydroxide solution respectively. No correction is made for carbon or hydrogen from inorganic matter in the coal.

NITROGEN DETERMINATION.

Nitrogen is determined by the Kjeldahl-Gunning method. One gram of the air-dried coal is digested with 30 c. c. of concentrated sulphuric acid, 0.5 gram of metallic mercury, and 5 grams of potassium sulphate, until the carbon has been completely oxidized and all the nitrogen has been converted to ammonium sulphate. After dilution with water and precipitation of the mercury by the addition of potassium sulphide, an excess of sodium hydroxide is added and the ammonia determined by distillation.

DETERMINATION OF CALIFORIC VALUE.

The heat of combustion is determined with the bomb calorimeter. One gram of the air-dried coal is completely burned in compressed oxygen gas and the total heat evolved is absorbed in a weighed quantity of water in which the bomb is immersed. The rise in tem-

perature of the water is measured with a thermometer that is graduated in hundredths of 1°C ., and can be read, by means of a cathetometer, to 0.002°C .

Corrections are made for "radiation losses," oxidation of nitrogen to aqueous nitric acid, and oxidation of sulphur dioxide to aqueous sulphuric acid. The calorific value obtained in this manner is the total heat of combustion with water vapor condensed to liquid water at the temperature of the calorimeter, that is, 20° to 25°C .

INTERPRETATION OF ANALYTICAL RESULTS.^a

The coal analyses reported in this bulletin are grouped in the usual manner, as follows:

1. The proximate analysis, including results of determinations of moisture, volatile matter, fixed carbon, and ash.

2. The ultimate analysis, including results of determinations of carbon, hydrogen, nitrogen, oxygen, sulphur, and ash.

3. The calorific value, heating value, or heat of combustion.

The analysis of each sample is given in three conditions, as follows:

- (1) As received at the laboratory, (2) computed to a moisture-free condition, and (3) computed to a moisture-free and ash-free condition.

The analysis of the sample "as received" (condition 1) represents the actual sample as received at the laboratory and, as regards a mine sample, represents the coal as it occurs in the mine. The "moisture-free" analysis (condition 2) represents the relative composition and heating value of the dry coal; this form of analysis is convenient for comparing similar coals of variable moisture content. The "moisture-free and ash-free" analysis represents approximately the relative composition and calorific value of the dry organic or combustible matter. This form of analysis is only an approximation because the ash does not have the same weight as the inorganic or incombustible matter in the coal. However, the error does not exceed 1.5 per cent in comparing coals that do not vary much in the character and amount of ash and sulphur.

PROXIMATE ANALYSIS.

The proximate analysis of coal originated in response to the industrial demand for laboratory tests of the relative amounts of certain compounds, either present in the coal or derived from it, that affect its use as a fuel. These compounds are grouped by the proximate analysis as follows:

^a See also, Fieldner, A. C., Notes on the sampling and analysis of coal: Tech. Paper 76, Bureau of Mines, 1914, pp. 23-57.

(1) Water or moisture; (2) mineral impurities that remain in a somewhat altered condition as ash when the coal is burned; (3) organic or combustible matter, which is approximately represented by the volatile matter and fixed carbon.

MOISTURE CONTENT.

The moisture in coal consists of (1) extraneous moisture, which comes from external sources, such as underground waters trickling over the face of the coal bed, through the coal bed, and, in places going to the dip, from the coal shot down lying in water, condensation from saturated mine air, or, as regards car samples, from atmospheric precipitation or from water used for washing the coal, and (2) inherent moisture, which is one of the products of the original vegetable matter from which coal is derived.

Analysis does not differentiate between extraneous and inherent moisture, because in air-drying coal not only is the extraneous or superficial moisture removed but also more or less of the inherent moisture, the amount depending on the fineness of the coal and the humidity of the air. The percentage loss of weight on air drying should be regarded merely as an indication of the relative tendency of different coals to lose moisture, after removal from the mine, on exposure to comparatively dry atmospheres.

The loss of weight on air drying at 30–35° C., combined with the loss of weight occurring when the air-dried sample is heated in a current of dry air at a temperature of 105° C., is considered equal to the total moisture in the coal as received at the laboratory.

ASH.

Ash is the incombustible residue left from complete combustion of the coal. It is derived from the inorganic matter in the coal, and is composed largely of compounds of silica, alumina, lime, and iron, together with smaller quantities of magnesia, titanium, and alkali compounds. The silica, alumina, and titanite oxide are derived from sand, clay, shale, and "slate"; the iron oxide mainly from iron pyrite; and the lime and magnesia from their corresponding carbonates and sulphates.

The ash-forming constituents consist of (1) "inherent" or "intrinsic" impurities that are present in an intimate mixture with the coal substance, and are derived either from the original vegetable material or from external sources during the accumulation of coal-forming plant remains; (2) impurities formed either during the laying down of the coal bed or subsequently, which occur in the form of partings, "veins," and nodules of clay, shale, pyrite, and calcite; and (3) impurities that become mechanically mixed with the coal in the process of mining, such as fragments of roof and floor.

INHERENT IMPURITIES.

The percentage of ash derived from the intimately mixed impurities may be determined by selecting a sample of clean lumps of homogeneous coal, or, better, by placing the coarsely crushed coal in a solution of calcium or zinc chloride with a specific gravity of 1.35. The coal will float and the heavier extraneous impurities will sink. In this way a sample of clean coal may be prepared for analysis. In some samples the percentage of "intrinsic" ash is so low that the ash must have come exclusively from the original coal-forming vegetation. Certain coals have deposited in their minute joints or cleavage planes thin flakes of calcite, gypsum, silica, or clay, and some have veinlets of pyrite. These impurities are not intimately mixed with the coal substance, but can not be separated from the coal by any commercial methods of preparation. In some coals, also, microscopic crystals of pyrite are so distributed that washing does not appreciably lower the sulphur content.

EXTRANEOUS IMPURITIES.

The percentage of ash derived from extraneous impurities varies considerably, depending on the number and size of the partings in the seam, the possibility of separating them from the coal, and the care with which the coal is mined. Such impurities of this character, when in the form of "slate" or bone, may be removed to some degree by suitable methods of washing, picking, or screening. The possibility of improving the quality of coal by washing may be determined by the laboratory float-and-sink test already described.

Coal ash, as determined, usually weighs less than the organic matter from which it is produced because of the loss of volatile constituents during ignition. Shale and clay lose their water of hydration; the carbonates are more or less decomposed, giving off carbon dioxide, and the iron pyrite is changed to ferric oxide, giving off sulphur dioxide, either to the atmosphere or to the free calcium oxide that has been formed from the carbonate. In coals containing calcium carbonate a large proportion of the sulphur may be retained in the ash as calcium sulphate.

VOLATILE MATTER AND FIXED CARBON.

The volatile matter and fixed carbon represent approximately the relative proportions of gaseous and solid combustible matter that are obtained from coal by heating it in a closed vessel. The volatile matter consists chiefly of the combustible gases hydrogen, carbon monoxide, and methane and other hydrocarbons, and some non-combustible gases, as carbon dioxide and water vapor. The volatile

matter does not include the water that can be removed from the coal by heating it at 105°C .

From the standpoint of the analyst, 950° to $1,000^{\circ}\text{C}$. appears to be the best temperature for the determination of volatile matter, as most duplicate determinations made within those limits agree within 0.5 per cent.

The residue of coke left in the crucible after the ash has been deducted is reported as "fixed carbon." The fixed carbon does not represent the total carbon in the coal, for a considerable part of the carbon is expelled as volatile matter, being in combination with hydrogen as hydrocarbon or with oxygen as carbon monoxide and carbon dioxide. Furthermore, fixed carbon is not pure carbon. The carbonized residue contains, in addition to the ash-forming constituents, several tenths per cent of hydrogen and oxygen, from 0.4 to 1.0 per cent nitrogen, and approximately half the sulphur that was in the coal. The terms "volatile matter" or "volatile combustible matter" and "fixed carbon" do not represent definite compounds that existed in the coal before heating. The method of determination is arbitrary, and results are comparable only when the temperature and rate of heating are the same. In general the sum of the fixed carbon and ash may be taken as representing the relative amount of coke yield from coking coals. However, the conditions under which the laboratory determination is made are so different from the conditions in the commercial manufacture of coke or gas that no close agreement can be expected. The slow rate of heating in the industrial processes yields several per cent more coke than is obtained in the laboratory determination.

SULPHUR.

In the proximate analysis of coal the sulphur is included in the volatile matter, fixed carbon, and ash. If the ash contains no lime or alkali oxides, all the sulphur is distributed between the volatile matter and fixed carbon, approximately half the sulphur being retained by the fixed carbon and the remainder escaping with the volatile matter.

FORMS OF OCCURRENCE IN COAL.

Sulphur occurs in coal (1) as pyrite or marcasite, (2) as sulphate of iron, lime, and alumina, and (3) in combination with the coal substance as organic compounds.

In some coal beds balls, lenses, and bands of pyrite are easily distinguishable in the face of the bed, and may be largely removed by breaking up the lumps of coal containing them and by suitable washing or picking. In other beds the pyrite is disseminated

throughout the lumps of coal in veinlets or in such small particles that it is not practicable to separate them from the lump coal or even to remove them from the screenings by washing.

Sulphur combined as sulphates of iron, lime, and alumina may be found in weathered coal. On exposure to air pyrite and marcasite tend to absorb oxygen and form iron sulphate. Sulphur combined as sulphate has no heating value.

Next to pyritic sulphur the most prominent form of sulphur in coal is that which occurs in some organic combination with the coal substance. There is no direct method of quantitatively determining the relative amounts of pyritic and "organic" sulphur. However, as regards many coals, if all the sulphate sulphur and an amount of sulphur sufficient to form pyrite equivalent to all the iron in the coal be deducted from the total sulphur, there yet remains a considerable amount of sulphur.

ULTIMATE ANALYSIS.

In the ultimate analysis the composition of coal is expressed in percentages of ash, sulphur, carbon, hydrogen, nitrogen, and oxygen. The sum of these constituents is taken as equal to 100 per cent. As there is no simple direct method for the determination of oxygen, it is estimated by subtracting the sum of the other five constituents from 100. This method throws the summation of all the errors incurred in the other determinations upon the oxygen.

The determination of carbon, hydrogen, and nitrogen, although requiring experience and a considerable degree of skill on the part of the chemist, is not subject to the arbitrary conditions that must be maintained in the proximate analysis. As the chemist is dealing with definite chemical elements, he should be able to make duplicate determinations, agreeing within the following limits: Carbon, 0.3 per cent; hydrogen, 0.07 per cent; nitrogen, 0.05 per cent.

CALIFORIC VALUE.

DIRECT DETERMINATION IN THE BOMB CALORIMETER.

The most accurate method of determining the total heating value is by combustion in a bomb calorimeter. The instrument should be carefully standardized by burning substances of known calorific value, such as the standard samples of cane sugar, naphthalene, and benzoic acid, that are now being furnished by the Bureau of Standards. The standardization should be conducted under exactly the same conditions and with the same thermometer that is used in the tests. The use of calibrated thermometers is essential. In carefully conducted calorimetric work the probable error should not exceed 0.3 per cent, which corresponds to about 50 B. t. u. in a high-grade coal.

This degree of accuracy is higher than can be obtained in the usual methods of sampling, the error introduced by which oftentimes increases the total error to 100 B. t. u.

CALCULATION OF CALORIFIC VALUE BY DULONG'S FORMULAS.

Before the bomb calorimeter came into general use the heating value of a coal was frequently calculated from the ultimate analysis by one of Dulong's formulas. These formulas, which are occasionally used in the bureau's work to verify results with the bomb calorimeter, are as follows:

(1) Calorific value in calories per gram = $8080C + 34460(H - \frac{O}{8}) + 2250S$.

(2) Calorific value in B. t. u. per pound = $14544C + 62028(H - \frac{O}{8}) + 4050S$.

There is fairly close agreement between the calorific values calculated by Dulong's formula and those determined by the calorimeter. In coals of higher rank than subbituminous the agreement is usually within 1.5 per cent.

DESCRIPTIONS OF SAMPLES.

The samples of coal and the mines from which they were taken are described in the same general manner as the corresponding information was presented in Bulletin 22. The descriptions have been compiled from published reports or from the note books of the engineers or geologists who collected the samples and necessarily vary in completeness. The purpose of the descriptions is to present such information as bears on the significance of the analyses and to give supplementary details, such as methods of mining and clearing coal, that may be of assistance to Government engineers or purchasing agents and to other persons in preparing specifications and awarding contracts for fuel.

The names of the coal beds, geologic formations, mining districts, and coal fields are those used by the United States Geological Survey. In the descriptions of the sections of coal beds, the word "shale" has been substituted for the "slate" of collectors and "bony coal" or "bone" for "bone coal."

CLASSIFICATION OF COAL.

The usage of the Survey has been followed also in the classification of the coals. The following statement on coal classification is made by Campbell ^a in a recent report.

^a Campbell, M. R., Analyses of coal samples from various fields in the United States: U. S. Geol. Survey Bull. 541, 1914.

The classification of coal into various grades, such as bituminous, semibituminous, and lignite, is arbitrary and not at all satisfactory, but it is in common use in the United States, and it seems desirable to give the class for each sample, because from the analysis one could not always determine this important point. The classes generally used in the United States are as follows: Anthracite, semianthracite, semibituminous, bituminous, subbituminous, and lignite.

Anthracite.—Anthracite coal is generally well known, but in a systematic classification it is generally defined as a hard coal having a fuel ratio (fixed carbon divided by volatile matter) of not less than 10. Most of this coal comes from the anthracite fields of eastern Pennsylvania, but small areas are known in some of the Western States.

Semianthracite.—Semianthracite coal has a fuel ratio ranging from 6 or 7 to 10. There is only a small amount of this coal in the United States.

Semibituminous.—Semibituminous coal is of great commercial importance, but is not widely distributed. Its fuel ratio ranges from 3 to 6 or 7. It is the best steam coal in the country, and some of it can be utilized in the manufacture of coke. The centers of production are the Pocahontas and New River fields of Virginia and West Virginia, Georges Creek field of Maryland, Windber field of Pennsylvania, and the western end of the Arkansas field in the vicinity of Fort Smith. Though small areas containing this grade of coal have been found in Washington and Colorado, the amount of such coal in these fields is small.

Bituminous.—Bituminous coal is the most important grade in the country and includes most of the coals east of the Rocky Mountains. In the Western States there are large areas of bituminous coal, such as the Trinidad-Raton field of Colorado and New Mexico; the Grand Hogback field of Colorado; the Book Cliffs field of Utah; the Rock Springs, Kemmerer, and Black Hills fields of Wyoming; the Great Falls field of Montana; and many districts of Washington. This grade furnishes most of the coking coal of the country, and it is largely sold for steam raising and for domestic use.

Subbituminous.—The term "subbituminous" has been adopted by the United States Geological Survey for what has generally been called "black lignite." The latter term is objectionable, for the reason that the coal is not lignitic in the sense of being woody, and the use of the term seems to imply that the coal is little better than the brown, woody lignite of North Dakota, whereas many of the coals of this class closely approach the lowest grade of bituminous coal. In fact, it is extremely difficult to separate this class from the one below and the one above. It is generally distinguished from lignite by its color and freedom from apparent woody texture and from bituminous coal by the slacking it undergoes when exposed to the weather. As the latter is an important difference in commercial use, it has been adopted by the Geological Survey as the criterion for the separation of subbituminous and bituminous coals.

Subbituminous coal is found in most of the western fields, being well known in the field about Boulder and Denver and in North Park, Colo.; Gallup, N. Mex.; Hanna, Douglas, Sheridan, and the Bighorn Basin, Wyo.; Red Lodge and Musselshell, Mont., and in many of the districts of Washington and Oregon.

Lignite.—As used by the Geological Survey the term "lignite" is restricted to the coals that are distinctly brown and generally woody. They are intermediate in quality between peat and subbituminous coal. Lignite is abundant in the North in eastern Montana and North Dakota and in the northwest corner of South Dakota. In the South it is present in all of the Gulf States, but it has been developed commercially only in Texas.

TABULATED ANALYSES.

On the following pages are given the analyses of the samples of coal collected during the period covered by this report.

In the first column of the table, locations of samples are, for brevity, not worded as in the detailed descriptions (pp. 147-405). The word "cut" denotes thickness of coal sampled.

Table of chemical analyses.

Locality, bed, etc.	Mine notes ^a (page).	Sample.		Proximate.					Ultimate.					Calorific value.		
		Laboratory No. ^b	Kind. ^c	Con- dition. ^d	Mois- ture.	Vola- tile mat- ter.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ALABAMA.																
JEFFERSON COUNTY.																
Littleton, near, 20 miles northwest of Birmingham: Banner mine, Big or Mary Lee bed (rib near mouth, room 4, right entry 5, 2,000 feet east of shaft No. 1, 8-foot 7½-inch bed, 6-foot 11½-inch cut).	147	12083	A	1	2.48	26.77	59.40	11.35	0.86							
				2	2.88	27.45	60.91	11.64	.88							
				3	3.17	31.07	68.93		1.00							
Same (rib near mouth of room 2, left entry 8, 2,400 feet east of shaft No 1, 10-foot 4-inch bed, 7-foot 6-inch cut).	147	12084	A	1	2.29	26.73	59.84	11.14	.74							
				2	2.36	27.36	61.24	11.40	.76							
				3	3.08	30.88	69.12		.86							
Same (right rib of main slope at mouth of left entry 9, 2,700 feet east of shaft No. 1, 10-foot bed, 7-foot 4-inch cut).	147	12085	A	1	2.42	26.89	60.04	10.65	.87							
				2	2.56	27.56	61.53	10.91	.89							
				3	3.04	30.94	69.06		1.00							
Same (composite of samples 12083, 12084, and 12085).	147	12086	A	1	2.53	26.94	59.48	11.05	.79	4.80	74.44	1.59	7.33	1.4	7.381	13,286
				2	2.64	27.64	61.02	11.34	.81	4.61	76.38	1.63	5.20		7.573	13,631
				3	3.18	31.18	68.82		.91	5.23	86.15	1.84	5.87		7.542	15,376
Morris, 4 miles east of; Indio mine, Jefferson bed (face of room 7, off left south entry 5, 2,000 feet south-east of shaft, 4-foot 5-inch bed, 2-foot 7-inch cut).	148	16683	A	1	1.96	30.97	59.03	8.04	3.26						7,705	13,869
				2	2.23	31.59	60.21	8.20	3.33						7,849	14,146
				3	3.41	34.41	65.59		3.63						8,501	15,410
Same (face of room 4, off right north entry 7, 2,500 feet northeast of shaft, 4-foot 8-inch bed, 2-foot 9-inch cut).	148	16684	A	1	2.23	30.96	59.91	6.90	2.56						7,828	14,090
				2	2.31	31.67	61.27	7.06	2.62						8,006	14,411
				3	3.08	31.08	65.92		2.82						8,614	15,505
Same (entrance to room 4, off right south entry 6, 4-foot 4-inch bed, 2-foot 4½-inch cut).	148	16687	A	1	1.95	30.88	59.40	7.77	2.45						7,736	13,925
				2	2.31	31.39	60.59	7.92	2.70						7,890	14,202
				3	3.20	34.20	63.80		2.72						7,569	15,424
Same (in main south aircourse, at left south entry 6, 4-foot 1-inch bed, 2-foot 7-inch cut).	148	16686	A	1	1.83	30.54	61.11	6.52	2.68						7,873	14,171
				2	2.33	31.11	62.25	6.64	2.73						8,019	14,434
				3	3.32	33.32	66.68		2.92						8,589	15,460
Same (composite of samples 16683, 16684, 16685, and 16686).	148	16687	A	1	1.95	30.06	60.04	7.35	2.75	4.93	77.71	1.70	5.56	1.1	7,757	13,963
				2	2.31	31.27	61.23	7.50	2.80	4.80	79.26	1.73	3.91		7,911	14,240
				3	3.81	33.81	66.19		3.03	5.19	85.69	1.87	4.22		8,553	15,395

^a Figures in column No. 2 refer to page of this bulletin where may be found the description of the section in the mine where the sample was taken.

^b Laboratory numbers with a prefix "W" represent samples analyzed in the Washington laboratory of the bureau; all others were analyzed at the Pittsburgh laboratory.

An asterisk preceding the laboratory number indicates that the volatile matter was determined by the modified method, see page 7.

^c The kind of sample is denoted by letter, as follows: A=mine sample collected by an inspector of the Bureau of Mines; B=mine sample collected by a geologist of the United States Geological Survey; C=car sample taken at the fuel-testing plant.

^d The form of analysis is denoted by number, as follows: 1=sample as received; 2=dried at a temperature of 105° C.; 3=moisture and ash free.

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.		Proximate.					Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Con- dition.	Mois- ture.	Volu- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- rific units.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ALABAMA—Continued.																
ST. CLAIR COUNTY.																
Coal City: Coal Branch mine, Coal City bed (first left room off entry 26, 3,000 feet north of slope mouth, 5-foot bed, 4-foot 10-inch cut). Same (end of entry 34, 2,800 feet north of slope mouth, 3-foot 10-inch cut).	149	12440	B	1	2.79	32.92	60.28	4.01	1.10					1.8	8,053	14,495
				2		33.86	62.01	4.13	1.13						8,284	14,911
	149	12441	B	1	1.97	34.32	58.21	5.30	1.30					1.2	8,061	15,554
Same (end of room 32, 3,000 feet northeast of slope mouth, 2-foot 10-inch cut).	149	12442	B	1	2.41	33.72	60.65	3.22	1.41						8,103	14,693
				2		35.01	59.38	5.61	1.33						8,608	15,366
				3		37.09	62.91		1.81					1.4	8,214	14,785
Same (composite of samples 12440, 12441, and 12442).	149	12443	B	1	2.38	33.31	60.00	4.31	1.07	5.27	81.85	1.46	6.04	1.5	8,704	15,667
				2		34.12	61.46	4.42	1.10	5.13	83.85	1.50	4.00		8,138	14,648
				3		35.70	64.30		1.15	5.37	87.72	1.57	4.19		8,337	15,007
Coal City: Vulcan No. 4 mine, Broken Arrow bed (room 21, off left heading 2, 750 feet southeast of mine mouth, 4-foot 11-inch bed, 3-foot 34-inch cut). Same (in mine 1, 100 feet east of mine mouth, 4-foot 9-inch bed, 3-foot 8-inch cut).	149	12436	B	1	3.76	29.07	58.67	8.50	1.46					2.9	8,722	15,700
				2		30.21	60.96	8.83	1.52							
				3		33.14	66.86		1.67					2.7		
Same (room 15, left heading 2, 600 feet south of mine mouth, 3-foot 5-inch cut).	149	12437	B	1	3.54	29.04	59.20	8.22	1.36							
				2		32.01	61.37	8.52	1.41							
				3		32.91	67.09		1.54							
Same (composite of samples 12436, 12437, and 12438).	149	12438	B	1	4.42	27.72	56.57	11.29	1.43					3.7		
				2		29.00	59.19	11.81	1.50							
				3		32.88	67.12		1.46							
Straven; sec. 7, T. 21 S., R. 3 W.: Straven mine, Upper Straven bed (near end of slope, 2,000 feet north of slope mouth, 4-foot 104-inch bed, 3 foot 4-inch cut).	149	12439	B	1	3.94	28.14	58.59	9.33	1.52	5.10	75.71	1.32	7.08	3.1	7,498	13,496
				2		29.29	61.00	9.71	1.52	4.85	78.81	1.37	3.74		7,805	14,049
				3		32.44	67.56		1.68	5.37	87.28	1.52	4.15		8,644	15,559
SHELBY COUNTY.																
Straven; sec. 7, T. 21 S., R. 3 W.: Straven mine, Upper Straven bed (near end of slope, 2,000 feet north of slope mouth, 4-foot 104-inch bed, 3 foot 4-inch cut).	150	14391	B	1	3.06	35.64	53.33	7.97	.59					1.0	7,318	13,172
				2		36.77	55.01	8.22	.61						7,549	13,588
				3		40.06	59.94		.66						8,225	14,580

154	12723	A	1	4.78	14.22	78.61	2.39	58	3.69	81.67	1.59	10.08	7,460	13,428
			2	.....	14.93	82.56	2.51	61	3.32	85.77	1.97	6.12	7,834	14,101
			3	.....	15.31	84.69	.....	63	3.41	87.97	1.71	6.28	7,834	14,463
154	12729	A	1	1.41	8.64	69.07	20.88	77	3.05	70.51	1.38	3.41	6,612	11,902
			2	.....	8.76	70.06	21.18	78	2.93	71.52	1.40	2.19	6,707	12,073
			3	.....	11.11	88.89	.....	99	3.72	90.74	1.78	2.77	8,509	15,316
154	12733	A	1	3.65	9.20	84.58	2.57	60	3.20	86.49	1.11	6.03	7,879	14,182
			2	.....	9.55	87.78	2.67	62	2.90	89.77	1.15	2.89	8,178	14,720
			3	.....	9.81	90.19	.....	64	2.98	92.23	1.18	2.97	8,402	15,124
154	12730	A	1	5.13	9.17	60.87	24.83	49	2.57	61.88	0.94	4.93	5,488	9,878
			2	.....	9.67	64.16	26.17	52	2.11	65.23	1.04	2.94	5,785	10,413
			3	.....	13.10	86.90	.....	70	2.86	88.35	1.41	6.08	7,836	14,105
154	12719	A	1	3.40	9.25	76.05	11.30	51	2.95	77.92	1.04	6.28	7,061	12,710
			2	.....	10.88	78.72	.....	53	2.66	80.66	1.08	3.37	7,310	13,158
			3	.....	14.55	89.15	11.70	60	3.01	91.35	1.22	3.82	8,279	14,902
155	12730	A	1	8.60	13.50	88.87	9.03	56	3.96	86.37	1.32	18.56	6,111	11,000
			2	.....	14.77	73.35	9.88	61	3.28	72.83	1.44	11.96	6,086	12,035
			3	.....	16.39	83.61	.....	68	3.64	80.81	1.60	13.27	7,419	13,354
155	12722	A	1	.96	16.69	69.37	12.98	130	3.98	76.43	1.41	3.90	7,476	13,456
			2	.....	16.85	70.04	13.11	131	3.91	77.17	1.42	3.08	7,549	13,588
			3	.....	19.39	80.61	.....	151	4.50	88.81	1.63	3.55	8,688	15,638
155	12731	A	1	1.03	15.97	65.02	17.98	238	3.58	72.21	1.25	2.60	6,958	12,525
			2	.....	16.14	65.69	18.17	240	3.51	72.96	1.26	1.70	7,030	12,654
			3	.....	19.72	80.28	.....	293	4.29	89.16	1.54	2.08	8,591	15,464
155	12721	A	1	2.55	9.45	76.60	11.40	93	3.35	78.26	1.02	4.44	7,253	13,073
			2	.....	9.70	78.60	11.70	95	3.15	80.31	1.06	2.23	7,463	13,415
			3	.....	10.99	89.61	.....	108	3.57	90.95	1.88	2.52	8,441	15,194
155	15355	A	1	1.18	17.41	78.39	3.02	66	4.47	86.62	1.82	3.41	8,335	15,003
			2	.....	17.62	79.32	3.06	67	4.39	87.65	1.84	2.39	8,434	15,181
			3	.....	18.18	81.82	.....	69	4.53	90.42	1.90	2.46	8,701	15,662
155	15356	A	1	.98	16.40	72.34	10.28	61	4.21	79.71	1.64	3.55	7,705	13,869
			2	.....	16.56	73.06	10.38	62	4.14	80.40	1.66	2.70	7,781	14,006
			3	.....	18.48	81.52	.....	69	4.62	89.82	1.83	3.02	8,082	15,028
155	15357	A	1	2.68	16.25	76.30	4.77	63	4.45	83.85	1.68	4.62	8,090	14,562
			2	.....	16.70	78.40	4.90	65	4.26	86.16	1.73	2.30	8,312	14,962
			3	.....	17.56	82.41	.....	68	4.48	90.60	1.82	2.42	8,740	15,732
155	15358	A	1	1.51	16.32	76.26	3.91	63	4.28	81.04	1.72	3.40	8,059	14,506
			2	.....	16.57	77.43	6.00	66	4.17	83.33	1.75	2.09	8,182	14,728
			3	.....	17.63	82.37	.....	70	4.44	90.77	1.89	2.25	8,704	15,657
155	15359	A	1	1.22	16.36	78.90	4.48	63	4.42	83.64	1.60	3.15	8,207	14,773
			2	.....	16.56	78.90	4.54	66	4.33	86.70	1.68	2.18	8,305	14,956
			3	.....	17.35	82.65	.....	69	4.54	90.83	1.76	2.08	8,705	15,069
155	15360	A	1	1.38	16.48	78.38	3.76	67	4.38	85.11	1.82	4.26	8,266	14,839
			2	.....	16.71	79.48	3.81	68	4.29	86.30	1.85	3.07	8,382	15,088
			3	.....	17.37	82.63	.....	71	4.46	89.72	1.92	3.19	8,714	15,685

Hartline No. 6 mine.....

Hunts mine.....

Mount Ann; top of mountain.....

 Taken on way up mountain.....

 Near top of mountain.....

Mount Hamilton; $\frac{1}{2}$ mile south of U. S. L. M.; McDonald mine, unnamed bed; Christopher group, near south line, top of ridge.

 Same (Face of entry, head of entry).....

 Same (in mine).....

St. Mary's Creek; Hartline No. 7 mine.....

Trout Creek, Cunningham claims on; prospect, tunnel No. 4 (chute between timber sets 19 and 20, 76 feet from drift mouth, 10 feet from entry; 5-foot 4-inch cut).

 Same (rib of right crosscut between timber sets 18 and 19, 72 feet from drift mouth and 17 feet from entry; 4-foot 1-inch cut).

 Same (rib at face of right crosscut, between timber sets 11 and 12, 44 feet from drift mouth, 8-foot 3-inch cut).

 Same (right crosscut between timber sets 25 and 26, 100 feet from drift mouth, 11 feet from entry, 6-foot 7-inch cut).

Prospect tunnel No. 5 (chute to left, between timber sets 21 and 22, 84 feet from drift mouth, 17 feet up chute, 5-foot 3-inch cut).

 Same (left crosscut between timber sets 13 and 14, 52 feet from drift mouth, 5 feet from entry, 5-foot 3-inch cut).

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.					Ultimate.					Calorific value.	
		Laboratory No.	Kind.	Con- diti- on.	Mois- ture.	Volu- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ALASKA—Continued.																
MATANUSKA.																
Anthracite Ridge, outcrop on ridge.....	156	12745	A	1	3.59	6.83	64.29	25.29	0.19	2.03	65.91	0.59	5.99	.....	5,704	10,268
				2	.....	7.08	66.69	26.23	.20	1.09	68.36	0.61	2.91	.....	5,916	10,650
				3	.....	9.60	90.40	.....	.27	2.29	92.67	0.83	3.94	.....	8,020	14,437
Outcrop on ridge.....	156	12750	A	1	1.72	37.43	39.55	21.30	.41	4.20	61.98	1.36	11.05	.....	5,966	10,738
				2	.....	38.09	40.24	21.67	.42	4.08	62.76	1.38	9.69	.....	6,070	10,926
				3	.....	48.63	51.37	.....	.54	5.21	80.13	1.76	12.36	.....	7,750	13,950
Outcrop on ridge.....	156	12753	A	1	1.12	13.03	75.67	10.18	.64	3.72	78.95	1.88	4.63	.....	7,534	13,562
				2	.....	13.18	76.52	10.30	.65	3.64	79.84	1.90	3.67	.....	7,619	13,714
				3	.....	14.69	85.31	.....	.72	4.06	89.01	2.12	4.09	.....	8,494	15,289
Near middle of south face of ridge. Barometer reading 4,100 (less 400 feet).	156	12746	A	1	2.85	7.75	77.34	12.06	.61	2.66	78.35	1.25	5.07	.....	7,073	12,732
				2	.....	7.98	79.61	12.41	.63	2.41	80.65	1.29	2.61	.....	7,280	13,105
				3	.....	9.11	90.89	.....	.72	2.75	92.08	1.47	2.98	.....	8,312	14,962
South slope, near center, barometer reading 4,500 (less 400).	157	12757	A	1	3.05	10.05	71.01	15.89	.35	2.55	74.03	0.80	6.38	.....	6,629	11,932
				2	.....	10.37	73.24	16.39	.36	2.28	76.36	0.83	3.78	.....	6,838	12,308
				3	.....	12.40	87.60	.....	.43	2.73	91.33	0.99	4.52	.....	8,178	14,720
Chickaloon Creek; at bend of creek, $\frac{1}{2}$ mile above Watson's camp (2-foot 9-inch cut, upper bench).	157	12752	A	1	1.21	19.14	56.01	23.64	.58	3.88	6.17	1.35	6.38	.....	6,237	11,226
				2	.....	19.37	56.70	23.93	.59	3.80	64.95	1.37	5.36	.....	6,313	11,363
				3	.....	25.46	74.54	.....	.78	5.00	85.38	1.80	7.04	.....	8,290	14,938
Same (position and bed same as No. 12752, 4-foot 10-inch cut, lower bench).	157	12704	A	1	1.10	19.62	60.11	19.39	.53	4.07	68.96	1.23	5.83	.....	6,702	12,108
				2	.....	19.62	60.77	19.61	.53	3.90	69.73	1.24	4.90	.....	6,827	12,244
				3	.....	24.41	75.59	.....	.68	4.46	86.74	1.54	6.10	.....	8,461	15,230
Tunnel No. 4, at Watson's camp (west crosscut off entry, 111 feet from entry mouth)	158	12758	A	1	0.80	19.75	67.75	11.70	.68	4.41	77.93	1.73	4.25	.....	7,558	13,604
				2	.....	19.91	68.30	11.79	.58	4.35	77.96	1.74	3.58	.....	7,619	13,714
				3	.....	22.57	77.43	.....	.63	4.33	88.38	1.97	4.66	.....	8,638	15,548
Prospect.....	158	12761	A	1	0.51	21.91	75.13	2.45	.83	4.32	86.71	1.79	3.74	.....	8,496	15,293
				2	.....	22.02	75.52	2.46	.85	5.00	88.90	1.85	3.32	.....	8,539	15,370
				3	.....	22.57	77.43	.....	.85	5.00	88.90	1.85	3.40	.....	8,539	15,370
Tunnel B (3 feet 3 inches, upper bench).....	158	12760	A	1	0.74	21.81	70.45	7.00	.44	4.59	81.93	1.41	4.63	.....	7,954	14,317
				2	.....	21.97	70.98	7.05	.44	4.54	82.54	1.42	4.61	.....	8,014	14,425
				3	.....	23.64	76.36	.....	.47	4.88	88.80	1.53	4.32	.....	8,621	15,518

Same. (3 feet 10 inches, lower bench).	158	12756	A	1	0.60	21.25	69.09	9.08	.45	4.53	80.23	1.33	4.38	7.808	14,055
Coal Creek; prospect.	158	12744	A	2	.....	23.51	69.51	9.13	.45	4.49	80.71	1.34	3.88	7,855	14,139
				1	1.75	31.30	54.05	12.90	.50	4.94	88.82	1.47	4.27	8,644	15,559
				2	.....	31.86	55.01	13.13	.42	5.10	71.32	1.55	8.71	7,139	12,851
Prospect.	158	12748	A	3	.....	36.67	63.33	3.63	.42	5.79	75.91	2.00	7.27	7,266	13,080
				1	2.45	37.67	56.25	3.63	.40	5.59	75.91	2.00	8.37	8,364	15,056
				2	.....	38.62	57.66	3.72	.41	5.45	77.82	2.05	10.55	7,697	13,855
(No data available).	159	12743	A	3	.....	40.11	59.89	10.89	.43	5.66	80.82	2.13	10.95	7,890	14,202
				1	2.50	36.00	50.61	11.17	.41	5.15	69.79	1.71	12.05	7,065	14,751
				2	.....	36.92	51.91	11.17	.42	4.99	71.58	1.75	10.09	8,195	13,719
				3	.....	41.56	58.44	.....	.47	5.62	80.58	1.97	11.35	7,247	13,045
Matanuska River. O'Brien claims, $\frac{1}{2}$ mile east of place where samples 12755 and 12762 were taken, 100 feet below top of bluff, S. 15° W. from east end of Anthracite Ridge.	159	12763	A	1	1.08	24.04	66.78	8.10	.55	4.83	78.35	1.57	6.60	7,746	13,942
				2	.....	24.30	67.51	8.19	.56	4.76	79.20	1.59	5.70	7,830	14,004
				3	.....	26.47	73.53	.....	.61	5.18	86.26	1.73	6.22	8,528	15,350
O'Brien claims, $\frac{1}{2}$ mile south of Matanuska River, north side of bluff, S. W. from east end of Anthracite Ridge (upper half of cut).	159	12755	A	1	2.08	25.20	64.24	8.48	.53	4.79	76.90	1.55	7.75	7,554	13,598
				2	.....	25.73	65.61	8.66	.54	4.66	78.53	1.58	6.03	7,714	13,885
				3	.....	28.17	71.83	9.48	.59	5.10	85.97	1.73	6.61	8,445	15,201
Same (lower half of cut).	159	12762	A	1	1.30	24.92	64.72	9.48	.50	4.82	77.32	1.46	6.42	7,612	13,701
				2	.....	24.82	65.57	9.61	.51	4.74	78.34	1.48	5.92	7,712	13,882
				3	.....	27.46	72.54	.....	.56	5.24	86.67	1.64	5.89	8,552	15,358
Near end on west side of same gulch where sample 12763 was taken, 35 to 55 feet above same.	160	12747	A	1	1.72	24.36	58.97	14.35	.46	4.46	70.78	1.42	7.35	6,992	12,585
				2	.....	24.79	60.00	13.21	.47	4.34	72.02	1.44	6.32	7,114	12,805
				3	.....	29.24	70.76	.....	.55	5.12	84.94	1.70	7.69	8,390	15,102
Near point where No. 12763 was taken, in east face of gulch 50 to 75 feet above same (across strata), about 50 feet from top of bluff.	160	12749	A	1	1.73	27.60	67.43	3.24	.55	5.01	82.31	1.65	7.23	8,117	14,610
				2	.....	28.09	68.61	3.30	.57	4.90	83.76	1.68	5.79	8,200	14,898
				3	.....	29.05	70.95	.....	.59	5.07	86.62	1.74	5.98	8,542	15,376
In the west face of bluff on creek flowing north by O'Brien's cabin, 300 yards or more up stream (south) from place where sample 12764 was taken.	161	12751	A	1	1.67	24.96	67.39	5.98	.48	4.80	79.79	1.76	7.19	7,849	14,128
				2	.....	25.38	68.54	6.08	.49	4.69	81.15	1.79	5.80	7,982	14,368
Same ($\frac{1}{2}$ mile south of Matanuska River, and short distance upstream from O'Brien cabin).	161	12754	A	3	.....	27.02	72.98	.....	.52	4.99	86.40	1.91	6.18	8,498	15,296
				1	2.70	25.72	64.46	7.12	.50	4.69	76.15	1.66	9.88	7,436	13,385
				2	.....	26.43	66.25	7.32	.51	4.51	78.26	1.71	7.69	7,642	13,756
				3	.....	28.52	71.48	.....	.55	4.87	84.44	1.85	8.29	8,246	14,843
West side and near top of bluff (facing east) across the gulch from place where No. 12751 was taken.	162	12759	A	1	3.12	25.18	65.77	5.93	.42	4.65	77.26	1.71	10.03	7,460	13,428
				2	.....	25.99	67.89	6.12	.43	4.44	79.75	1.77	7.49	7,700	13,860
				3	.....	27.68	72.32	.....	.46	4.73	84.95	1.89	7.97	8,202	14,764
Young Creek; longitude 148° 42' 12" west, latitude 61° 47' 40" north (outcrop near creek, freshly exposed surface, 12-foot 8-inch bed).	162	11382	B	1	10.57	33.80	50.57	5.06	.23	5.41	65.16	1.13	23.01	6,236	11,225
				2	.....	37.80	56.54	5.66	.26	4.74	72.86	1.26	15.22	6,973	12,551
				3	.....	40.07	59.93	.....	.28	5.02	77.23	1.34	16.13	7,391	13,304
COLORADO.															
ADAMS COUNTY.															
Bennett, 25 miles northeast of; sec. 12, T. 1 S., R. 61 W.; Thomas mine (at working face, 4-foot bed 100 feet south from bottom of 10-foot shaft).	163	*13141	B	1	35.00	27.39	30.23	7.38	.31	6.56	41.71	.74	43.30	3,879	6,982
				2	.....	42.14	46.51	11.35	.48	4.11	64.17	1.14	18.75	5,908	10,742
				3	.....	47.53	52.47	.....	.54	4.64	72.38	1.29	21.15	6,732	12,118

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
COLORADO—Continued.																
BOULDER COUNTY.																
Lafayette; Simpson mine, Simpson bed (room 1, off entry 125; 11-foot bed, 6-foot 10-inch cut).	163	*15165	A	1 2 3	20.71 31.82 40.13 41.98	43.98 55.47 58.02	3.49 4.40		0.45 .57 .60	6.04 4.72 4.94	57.80 72.90 76.25	1.20 1.51 1.58	31.02 15.90 16.63	10.3	5,523 6,966 7,286	9,941 12,539 13,115
DELTA COUNTY.																
Bowie, 1 mile from; T. 13 S., R. 91 W.; King mine, King bed (face of room 5, off left entry 3, 3,600 feet from mine mouth; 10-foot 2-inch bed and cut).	164	*15213	A	1 2 3	5.08 37.85 39.80	54.35 57.26 60.20	4.64 4.89		.60 .62 .66					2.3		
Dominguez, 2½ miles northeast of; Wells Gulch, Gunnison Valley; sec. 17, T. 4 S., R. 3 E.; Wells Gulch mine (in main entry about 200 feet from mouth of mine, 3-foot 11-inch bed, 1-foot 8-inch cut).	165	11106	B	1 2 3	3.45 40.20 42.86	51.75 53.60 57.14	5.99 6.20		.98 1.01 1.08					.5	7,281 7,541 8,039	13,107 13,574 14,471
EL PASO COUNTY.																
Calhan, 9 miles south of; sec. 18, T. 13 S., R. 62 W.; Mosby mine, Mosby bed (at face of entry, 30 feet from shaft bottom, 4-foot 8-inch bed, 4-foot 4-inch cut).	165	*10732	B	1 2 3	33.13 38.81 48.98	25.95 38.81 51.02	27.03 40.42 51.02	13.89 20.77	.30 .45	6.48 4.19 5.29	37.25 55.70 70.30	.68 1.02 1.29	41.40 17.87 22.55	20.8	3,444 5,150 6,500	6,199 9,270 11,700
Pikeview, 1 mile north of; sec. 18, T. 13 S., R. 66 W.; Pikeview mine, "A," bed (face of north entry 2, 4,000 feet northwest of shaft, 10-foot 6-inch bed, 7-foot 5-inch cut).	166	12099	A	1 2 3	26.20 44.06 44.06	29.67 40.20 55.94	37.67 51.05	6.46 8.75	.46 .45	6.13 4.36 4.78	49.36 66.88 73.29	.66 .89 .98	22.55 18.71 20.50	7.8	4,640 6,287 6,890	8,352 11,317 12,402
Ramah, 3 miles southwest of; sec. 27, T. 11 S., R. 61 W.; Purdon mine, Purdon bed (face of workings about 700 feet from entry, 6-foot 9½-inch bed, 6-foot 6-inch cut).	166	*10741	B	1 2 3	33.66 35.36 48.74	23.46 37.19 51.26	24.67 37.19	18.21 27.45	.32 .48 .66	6.51 3.87 5.33	33.21 50.06 69.00	.54 .81 1.12	41.41 17.33 23.89	25.2	3,059 4,611 6,356	5,506 8,300 11,441
FREMONT COUNTY.																
Chandler; sec. 22, T. 19 S., R. 70 W.; Chandler mine, Chandler bed (face of east entry 9, 4-foot 8-inch bed, 4-foot 2-inch cut).	167	13393	A	1 2 3	9.70 42.17 45.19	38.08 46.19 54.81	46.19 51.15	6.03 6.08	.46 .51 .55					5.2		

[illegible]

Table of chemical analyses—Continued.

Mine notes (page).	Sample.			Proximate.					Ultimate.					Calorific value.		
	Laboratory No.	Kind.	Con- dition.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- rific.	British thermal units.	
Locality, bed, etc.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
COLORADO—Continued.																
HUERFANO COUNTY.																
Oakview, 7 miles west of La Veta; sec. 10, T. 29 S., R. 68 W.; Oakdale mine (face of room 11, off second "cross," off main entry, 13-foot 10-inch bed and cut).	170	13526	A	1	6.79	38.59	45.78	8.84	0.56					2.6		
				2		41.40	49.12	9.48	.40							
				3		45.73	54.27		.46							
Same (face of main entry, 6-foot 6-inch cut).....	170	13527	A	1	8.56	38.67	43.65	9.12	.57					4.6		
				2		42.29	47.74	9.97	.62							
				3		46.97	53.03		.69							
Same (composite of samples 13526 and 13527)	170	13529	A	1	7.80	38.50	44.80	8.90	.53	5.17	65.48	1.09	18.83	3.6	6,412	11,542
				2		41.76	48.59	9.65	.57	4.66	71.02	1.18	12.92		6,954	12,517
				3		46.22	53.78		.63	5.16	78.60	1.31	14.30		7,697	13,855
Same (sample of natural coke, face of north en- try 4, 3-foot 6-inch cut).	170	13528	A	1	12.84	9.35	67.30	10.51	.44					11.5	6,365	11,457
				2		10.73	77.21	12.06	.50						7,303	13,145
				3		12.20	87.80		.57						8,304	14,947
JACKSON COUNTY.																
Coalmont; NW, $\frac{1}{4}$ SW, $\frac{1}{4}$ sec. 24, T. 7 N., R. 81 W.; Riach mine, Riach bed (at breast, about 225 feet east of opening, 77-foot bed, 7-foot cut).	171	12401	B	1	22.81	36.21	34.08	6.90	.70	6.30	51.74	1.14	33.22	5.9	5,004	9,007
				2		46.91	44.15	8.94	.91	4.88	67.03	1.48	16.76		6,483	11,069
				3		51.52	48.48		1.00	5.36	73.61	1.63	18.40		7,120	12,816
Higbo, 8 miles northwest of; SW, $\frac{1}{4}$ SE, $\frac{1}{4}$ sec. 24, T. 8 N., R. 82 W.; Mitchell mine, Mitchell bed (275 feet northeast of entry mouth, 8-foot cut).	171	* 12539	B	1	20.72	33.65	35.67	9.96	.83	6.32	51.67	1.27	30.35	4.1	5,024	9,043
				2		42.45	44.99	12.56	1.05	5.07	64.67	1.60	15.05		6,337	11,407
				3		48.55	51.45		1.20	5.80	73.96	1.83	17.21		7,247	13,045
4 miles northwest of, 18 miles northwest of Walden; SE, $\frac{1}{4}$ SE, $\frac{1}{4}$ sec. 31, T. 10 N., R. 81 W.; Monahan mine, Monahan bed (face of slope, 125 feet east of mine mouth, 4-foot 6-inch bed and cut.)	172	* 12540	B	1	19.70	32.77	44.06	3.47	.68	6.39	57.70	1.49	30.27	4.8	5,716	10,289
				2		40.81	54.87	4.32	.85	5.23	71.85	1.86	15.89		7,118	12,812
				3		42.65	57.35		.89	5.47	75.09	1.94	16.61		7,439	13,390
Walden, 5 miles northeast of; NE, $\frac{1}{4}$ NE, $\frac{1}{4}$ sec. 18, T. 9 N., R. 78 W.; McCallum mine, Sudduth bed (face of entry about 50 feet from mouth of entry, 35-foot bed, 7-foot cut).	172	* 12774	B	1	19.18	33.48	41.05	6.29	.27	5.75	56.34	.82	30.53	5.2	5,353	9,635
				2		41.42	50.80	7.78	.33	4.48	69.71	1.01	16.69		6,623	11,921
				3		44.92	55.08		.36	4.86	75.59	1.10	18.09		7,182	12,928

8½ miles from; NW. ¼ NE. ¼ sec. 35, T. 9 N., R. 78 W.; Marr mine, Sudduth bed (inside mouth of en- try, water beyond, 53-foot bed, 6-foot cut).	172	*12415	B	1	16.72	33.02	46.67	3.59	.16	5.63	60.20	.70	29.72	7.4	5.755	10.359
	2	.....		2	.....	39.65	56.04	4.31	.19	4.53	72.29	.84	17.84	.....	6.911	12.440
	3	.....		3	.....	41.43	58.57	.....	.20	4.73	75.54	.88	18.65	.....	7.222	13.000
7½ miles from; NW. ¼ SW. ¼ sec. 15, T. 9 N., R. 78 W.; Sudduth mine, Sudduth bed (face of main entry about 70 feet in, 50-foot bed, 20-foot cut).	172	*12414	B	1	19.97	32.54	42.49	5.00	.59	5.82	57.05	.78	30.76	8.2	6.741	9.754
	2	.....		2	.....	40.66	53.09	6.25	.74	4.50	71.28	.97	16.26	.....	7.419	12.188
	3	.....		3	.....	43.37	56.63	.....	.79	4.80	76.03	1.03	17.35	.....	7.223	13.001
10½ miles southeast of; SW. ¼ NE. ¼ sec. 14, T. 8 N., R. 78 W.; Winscom mine, Winscom bed (in entry about 125 feet northeast of mine mouth, 4-foot 5-inch bed, 2-foot 7-inch cut).	173	*12775	B	1	18.06	34.49	35.32	12.13	.80	5.82	52.44	1.11	27.70	5.2	5.153	9.275
	2	.....		2	.....	42.09	43.11	14.80	.98	4.65	64.00	1.35	14.22	.....	6.289	11.320
	3	.....		3	.....	49.40	50.60	.....	1.15	5.46	75.12	1.58	16.69	.....	7.381	13.286
JEFFERSON COUNTY.																
Morrison, 2½ miles from, 6 miles from Golden; secs. 23, 24, 25, 26, T. 4 S., R. 70 W.; White Ash mine, Jumbo bed (30 feet up from second level, 75 feet from shaft, 16-foot bed, 10-foot 6-inch cut).	173	*16615	A	1	28.67	30.69	34.85	5.79	.75	6.35	47.94	.69	38.48	15.8	4.533	8.159
	2	.....		2	.....	35.79	57.49	6.72	.71	4.43	67.21	.97	18.22	.....	6.355	11.439
	3	.....		3	.....	38.37	61.63	.....	.76	4.82	73.15	1.06	19.83	.....	6.917	12.451
LA PLATA COUNTY.																
Durango, 1½ miles southwest of; T. 35 N., R. 10 W.; San Juan mine, Mesaverde formation (face of main entry, 1,200 feet west of mine mouth, 3-foot 1-inch bed, 3-foot cut).	174	14770	A	1	3.83	34.42	55.29	6.46	.68	.....	.....	.....	.....	2.7	.....	.....
	2	.....		2	.....	35.79	57.49	6.72	.71	.....	.....	.....	.....	.....	.....	.....
	3	.....		3	.....	38.37	61.63	.....	.76	.....	.....	.....	.....	.....	.....	.....
Same (face of room 6, off first dip entry south, 300 feet from mine mouth, 5-foot 2-inch bed, 5-foot cut).	174	14771	A	1	2.24	34.06	56.49	7.21	.74	.....	.....	.....	.....	1.2	.....	.....
	2	.....		2	.....	34.84	57.78	7.38	.76	.....	.....	.....	.....	.....	.....	.....
	3	.....		3	.....	37.62	62.38	.....	.82	.....	.....	.....	.....	.....	.....	.....
Same (composite of samples 14770 and 14771).....	174	14772	A	1	3.01	34.77	55.31	6.91	.74	5.50	76.36	1.50	8.99	2.0	7.619	13.714
	2	.....		2	.....	35.85	57.03	7.12	.76	5.33	78.73	1.55	6.51	.....	7.855	14.139
	3	.....		3	.....	38.60	61.40	.....	.82	5.74	84.77	1.67	7.00	.....	8.457	15.223
Hesperus, 16 miles west of Durango; sec. 14, T. 35 N., R. 11 W.; Hesperus mine, Mesaverde formation (face of room 3, off right entry 4, 4,000 feet from mine mouth, 5-foot 2½-inch bed, 5-foot 2-inch cut).	175	14773	A	1	7.57	38.01	47.75	6.67	.70	.....	.....	.....	.....	4.2	.....	.....
	2	.....		2	.....	41.12	51.66	7.22	.76	.....	.....	.....	.....	.....	.....	.....
	3	.....		3	.....	44.32	55.68	.....	.82	.....	.....	.....	.....	.....	.....	.....
Same (room 3, off left entry 3, 4,000 feet west of mine mouth, 4-foot 7-inch bed, 4-foot 6-inch cut).	175	14774	A	1	6.59	38.94	49.31	5.16	.62	.....	.....	.....	.....	3.4	.....	.....
	2	.....		2	.....	41.69	52.79	5.52	.66	.....	.....	.....	.....	.....	.....	.....
	3	.....		3	.....	44.12	55.88	.....	.70	.....	.....	.....	.....	.....	.....	.....
Same (composite of samples 14773 and 14774).....	175	14775	A	1	7.08	38.10	48.97	5.85	.60	5.68	70.85	1.47	15.55	3.8	7.040	12.672
	2	.....		2	.....	41.00	52.70	6.30	.65	5.26	76.25	1.58	9.96	.....	7.576	13.637
	3	.....		3	.....	43.76	56.24	.....	.69	5.61	81.37	1.69	10.61	.....	8.085	14.553
Perins, 5 miles southeast of Durango; secs. 11 and 14, T. 35 N., R. 10 W.; Perins Peak mine, Mesaverde for- mation (room 3, off main entry, 3,200 feet from mine mouth, 5-foot 1-inch bed and cut).	175	14776	A	1	6.43	39.00	50.88	3.69	.85	.....	.....	.....	.....	4.4	.....	.....
	2	.....		2	.....	41.68	54.38	3.94	.85	.....	.....	.....	.....	.....	.....	.....
	3	.....		3	.....	43.39	56.61	.....	.88	.....	.....	.....	.....	.....	.....	.....
Same (face of room 13, off main back entry, 5-foot 5-inch bed and cut).	175	14777	A	1	4.05	39.52	49.04	7.39	4.02	.....	.....	.....	.....	2.4	.....	.....
	2	.....		2	.....	41.19	51.11	7.70	4.19	.....	.....	.....	.....	.....	.....	.....
	3	.....		3	.....	44.63	55.37	.....	4.54	.....	.....	.....	.....	.....	.....	.....
Same (composite of samples 14776 and 14777).....	175	14778	A	1	5.31	38.98	50.03	5.68	2.11	5.66	72.83	1.58	12.14	3.4	7.342	13.216
	2	.....		2	.....	41.17	52.83	6.00	2.23	5.35	76.91	1.67	7.84	.....	7.754	13.957
	3	.....		3	.....	43.80	56.20	.....	2.37	5.69	81.82	1.78	8.34	.....	8.249	14.818

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.				Ultimate.				Calorific value.			
		Laboratory No.	Kind.	Con- dition.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
COLORADO—Continued.																
LAS ANIMAS COUNTY.																
Cokedale; sec. 25, T. 33 S., R. 65 W.; Cokedale mine, Cokedale bed (face of room 8, off west entry 4, 6-foot 1-inch bed, 5-foot 4-inch cut).	176	11768	A	1	2.39	25.07	54.80	17.74	0.52					1.6		
				2		25.68	56.15	18.17	.53							
				3		31.38	68.62		.65							
Same (face of room 21, off west entry 1, 6-foot 10½-inch bed, 4 foot 9½-inch cut).	176	11769	A	1	2.74	26.77	56.22	14.27	.56					2.0		
				2		27.52	57.81	14.67	.58							
				3		32.25	67.75		.68							
Same (face of room 10, off west entry 6, 6-foot 1-inch bed, 5-foot 3-inch cut).	176	11770	A	1	2.12	24.85	53.39	19.64	.47					1.6		
				3		25.39	54.54	20.07	.48							
				3		31.76	68.24		.60							
Same (composite of samples 11768, 11769, and 11770).	176	11771	A	1	2.33	25.82	54.58	17.27	.52	4.62	69.14	1.07	7.38	1.7	6,854	12,337
				2		26.44	55.88	17.68	.53	4.46	70.79	1.10	5.44		7,018	12,632
				3		32.12	67.88		.64	5.42	86.00	1.34	6.60		8,525	15,345
Delagua, 20 miles north of Trinidad; sec. 15, T. 31 S., R. 65 W.; Delagua mine, Delagua bed (face of room 1, off east entry 24, off north entry 3, 5-foot 8-inch bed and cut).	177	11435	A	1	3.19	35.60	53.22	8.59	.57					1.9		
				2		36.16	54.97	8.87	.59							
				3		39.68	60.32		.65							
Same (face of east entry 18, off north entry 4, 6-foot 6-inch bed and cut).	177	11436	A	1	3.53	34.23	52.05	10.19	.47					2.3		
				2		35.48	53.96	10.56								
				3		39.67	60.33		.55							
Same (face of room 5, west entry 3, off north entry 4, 5-foot 8-inch bed, 5-foot 4-inch cut).	177	11437	A	1	3.14	33.37	50.96	12.53	.50					2.1		
				2		34.45	52.61	12.94	.52							
				3		39.57	60.43		.60							
Same (composite of samples 11435, 11436, and 11437).	177	11443	A	1	3.31	34.34	52.03	10.32	.55	5.09	71.57	1.38	11.09	2.1	7,063	12,713
				2		35.51	53.82	10.67	.57	4.88	74.02	1.43	8.43		7,305	13,149
				3		39.75	60.25		.64	5.46	82.86	1.60	9.44		8,177	14,719
Forbes; secs. 15 and 16, T. 32 S., R. 64 W.; Forbes No. 9 (or Cox) mine, Walsen bed (face of first cross-cut off west entry 1, 2,800 feet southwest of slope opening, 4-foot 4-inch bed and cut).	177	11926	A	1	2.14	30.50	56.99	10.37	.65					1.2		
				2		31.17	58.23	10.60	.66							
				3		34.87	65.13		.74							

177	11927	A	1	2.29	30.53	56.30	10.88	.60	.....	.....	.....	1.5	.....	.....
			2	.....	31.24	57.03	11.13	.61	.....	.....	.....	.....	.....	.....
			3	.....	35.15	64.85	.....	.69	.....	.....	.....	.....	.....	.....
178	11929	A	1	1.96	30.22	57.54	10.28	.59	.....	.....	.....	1.1	.....	.....
			2	.....	30.82	58.09	10.49	.60	.....	.....	.....	.....	.....	.....
178	11930	A	3	2.15	34.03	65.57	.....	.67	.....	.....	.....	.....	.....	.....
			3	.....	30.67	56.64	10.54	.61	5.01	75.31	1.31	7.22	7.512	13.522
			3	.....	31.34	57.89	10.77	.62	4.87	76.97	1.34	5.43	7.677	13.819
			3	.....	35.12	64.88	.....	.69	5.46	86.26	1.50	6.09	8.604	15.487
178	12028	A	3	2.85	32.65	55.26	9.24	.62	5.16	74.39	1.35	9.24	7.368	13.262
			2	.....	33.61	56.88	9.51	.64	4.99	76.57	1.39	6.90	7.584	13.651
			3	.....	37.14	62.86	.....	.71	5.51	84.62	1.54	7.62	8.381	15.085
178	12031	A	1	10.12	26.06	41.99	21.83	.51	.....	.....	.....	8.9	.....	.....
			2	.....	28.99	46.72	24.29	.57	.....	.....	.....	.....	.....	.....
			3	.....	38.29	61.71	.....	.75	.....	.....	.....	.....	.....	.....
178	12039	A	1	2.52	32.21	48.25	17.02	.75	.....	.....	.....	1.7	.....	.....
			2	.....	33.04	49.50	17.46	.94	4.76	68.19	1.23	7.42	6.834	12.301
			3	.....	40.03	59.97	.....	1.14	5.77	82.61	1.49	8.99	8.279	14.902
179	13361	A	1	2.13	32.68	53.57	11.62	.69	.....	.....	.....	1.6	.....	.....
			2	.....	33.39	54.74	11.87	.71	.....	.....	.....	.....	.....	.....
			3	.....	37.89	62.11	.....	.81	.....	.....	.....	.....	.....	.....
179	13362	A	1	3.60	31.71	45.67	19.02	1.12	.....	.....	.....	3.1	.....	.....
			2	.....	32.89	47.38	19.73	1.16	.....	.....	.....	.....	.....	.....
			3	.....	40.97	59.03	.....	1.45	.....	.....	.....	.....	.....	.....
179	13363	A	1	4.25	31.91	47.31	16.53	.56	.....	.....	.....	3.7	.....	.....
			2	.....	33.33	49.41	17.26	.58	.....	.....	.....	.....	.....	.....
			3	.....	40.28	59.72	.....	.70	.....	.....	.....	.....	.....	.....
179	13364	A	1	3.32	31.98	49.09	15.61	.82	4.93	67.66	1.23	9.75	6.865	12.357
			2	.....	33.08	50.77	16.15	.85	4.72	69.98	1.27	7.03	7.100	12.780
			3	.....	39.45	60.55	.....	1.01	5.63	83.46	1.51	8.39	8.467	15.241
180	W31143	A	1	1.9	30.8	51.5	15.8	.80	.....	.....	.....	.....	7.011	12.620
			2	.....	31.4	52.5	16.1	.80	.....	.....	.....	.....	7.144	12.800
			3	.....	37.4	62.6	.....	.95	.....	.....	.....	.....	8.517	15.330
180	W31144	A	1	1.4	33.0	53.9	11.7	.50	.....	.....	.....	.....	7.411	13.340
			2	.....	33.5	54.6	11.9	.50	.....	.....	.....	.....	7.517	13.530
			3	.....	38.0	62.0	.....	.57	.....	.....	.....	.....	8.533	15.300
180	W31145	A	1	1.6	29.6	55.4	13.4	.50	.....	.....	.....	.....	7.233	13.020
			2	.....	30.1	56.3	13.6	.50	.....	.....	.....	.....	7.356	13.240
			3	.....	34.8	65.2	.....	.58	.....	.....	.....	.....	8.511	15.320
180	W31146	A	1	1.4	31.7	55.0	11.9	.45	.....	.....	.....	.....	7.428	13.370
			2	.....	32.2	55.7	12.1	.45	.....	.....	.....	.....	7.539	13.570
			3	.....	36.6	63.4	.....	.51	.....	.....	.....	.....	8.578	15.440
181	W31147	A	1	2.0	29.0	56.1	12.9	.60	.....	.....	.....	.....	7.256	13.060
			2	.....	29.6	57.2	13.2	.60	.....	.....	.....	.....	7.406	13.330
			3	.....	34.1	65.9	.....	.69	.....	.....	.....	.....	8.533	15.360
181	W31149	A	1	1.0	28.3	56.5	14.2	.55	.....	.....	.....	.....	7.233	13.020
			2	.....	28.6	57.1	14.3	.55	.....	.....	.....	.....	7.306	13.130
			3	.....	33.4	66.6	.....	.64	.....	.....	.....	.....	8.528	15.350

Same (face of west entry 6, 3,800 feet southwest of slope opening, 3-foot 9-inch bed and cut).

Same (room 6, off west entry 4, 3,200 feet southwest of slope opening, 3-foot 11-inch bed and cut).

Same (composite of samples 11926, 11927, and 11929).

Hastings; sec. 25, T. 32 S., R. 64 W.; Hastings mine, Hastings bed (pillar between south entries 7 and 8, 8,300 feet from mouth of slope, 10-foot 5-inch bed, 9-foot 5-inch cut).

Same (in south entry 7, at fifth crosscut, 8,200 feet from mouth of slope).

Berwind (?) bed (face of slope, 5-foot 1-inch bed and cut).

Morley; Morley mine, Eagle-Starkville bed (face of room 2, third plane, off right entry 4, 5-foot 3-inch bed and cut).

Same (face of left entry 5, 6-foot 1-inch bed and cut).

Same (face of right entry 4, 3,000 feet from mine mouth, 5-foot 1-inch bed and cut).

Same (composite of samples 13361, 13362, and 13363).

Primero; secs. 23, 24, 25, and 26, T. 33 S., R. 66 W.; First Fast Primero mine, Primero bed (pillar of right entry 6, between rooms 1 and 2, off entry B-8, off blind entry 3, 6-foot 1-inch bed and cut).

Same (pillar of room 5, off west entry B-9, off blind entry 1, 5-foot 1-inch bed and cut).

Same (chain pillar of east entry B-9, 6-foot 5-inch bed and cut).

Same (face of room 4, off east entry B-10, 5-foot 11-inch bed and cut).

Same (face of room 3, off east entry 11, 7-foot 4-inch bed and cut).

Same (chain pillar of east entry B-10, off blind entry 3, 7-foot bed and cut).

Same (face of entry B-9, 7-foot 2-inch bed, 7-foot ½-inch cut).	181	W31151	A	1	1.9	30.6	54.7	12.8	.55	7.317	13.170
	2			2	31.2	55.8				7.456	13.420
	3			3	35.9	64.1				8.572	15.430
Same (composite of samples W31148, W31150, and W31151).	181	14039	A	1	1.42	32.31	53.33	12.94	.63	7.267	13.081
	2			2	32.78	54.09		5.04	73.46	1.71	6.35
	3			3	37.73	62.27		4.95	74.52	1.73	5.16
Same (taken from four cars while being loaded at the mine).	182	W31033	C	1	2.1	29.5	54.7	13.7	.59	5.70	83.78
	2			2	30.1	55.9					
	3			3	35.0	65.0					
Same (taken from same cars as sample 31033).....	182	W31034	C	1	1.1	30.8	54.0	14.1	.70	8.494	15.290
	2			2	31.1	54.6	14.3			7.189	12.940
	3			3	36.3	63.7				7.272	13.090
Same (taken from four cars while being loaded at the mine).	182	W31035	C	1	1.2	31.4	55.3	12.1	.58	8.483	15.270
	2			2	31.8	56.0	12.2			7.389	13.300
	3			3	36.2	63.8				7.478	13.460
Same (taken from same cars as sample 31035).....	182	W31036	C	1	1.1	31.2	55.4	12.3	.57	8.517	15.330
	2			2	31.6	56.0	12.4			7.344	13.220
	3			3	36.1	63.9				7.428	13.370
First West Primero mine, Primero bed (face of north entry 2, 4-foot 9-inch bed, 4-foot 5½-inch cut).	181	W31039	A	1	2.2	30.7	51.8	15.3	.65	8.478	15.260
	2			2	31.4	53.0	15.6			7.011	12.620
	3			3	37.2	62.8				7.167	12.900
Same (face of room 10, off north entry 1, 5-foot 4-inch bed and cut).	181	W31040	A	1	1.9	31.0	50.7	16.4	.60	8.489	15.280
	2			2	31.6	51.7	16.7			7.072	12.730
	3			3	37.9	62.1				8.489	15.280
Same (face of room 9, off south entry 2, 4-foot 9-inch bed, 4-foot 7-inch cut).	181	W31041	A	1	2.0	31.1	52.3	14.6	.55	7.072	12.730
	2			2	31.7	53.4	14.9			7.217	12.900
	3			3	37.3	62.7				8.483	15.270
Same (face of room 5, off right entry 1, off first west air course, 5-foot bed, 4-foot 7½-inch cut).	181	W31042	A	1	2.1	31.1	54.0	12.8	.60	7.283	13.110
	2			2	31.8	55.1	13.1			7.439	13.390
	3			3	36.6	63.4				8.561	15.410
Same (face of room 17, off right entry 2, off first west air course, 5-foot bed and cut).	181	W31043	A	1	2.8	30.4	51.2	15.6	.69	6.922	12.460
	2			2	31.3	52.7	16.0			7.117	12.810
	3			3	37.3	62.7				8.472	15.250
Same (composite of samples W31039, W31040, W31041, W31042, and W31043).	181	14058	A	1	2.02	30.38	52.80	14.80	.60	4.94	71.36
	2			2	31.01	53.89	15.10			6.42	72.83
	3			3	36.53	63.47				7.197	12.955
Same (taken from 4 cars while being loaded at the mine).	182	W31037	C	1	1.3	29.6	51.9	17.2	.72	5.68	85.79
	2			2	30.0	52.6	17.4				
	3			3	36.3	63.7					
Same (taken from same cars as sample 31037).....	182	W31038	C	1	1.2	30.1	51.5	17.4	.61		
	2			2	30.5	52.1	17.2				
	3			3	36.9	63.1					
Same (taken from car while being loaded at the mine).	182	W31139	C	1	1.2	29.8	52.0	17.0	.65	6.941	15.230
	2			2	30.2	52.6	17.2			7.028	12.650
	3			3	36.5	63.5				8.483	15.270
Same (taken from same car as sample 31139).....	182	W31140	C	1	1.1	29.2	52.7	17.0	.60	6.928	12.470
	2			2	29.5	53.3	17.2			7.006	12.610
	3			3	35.6	61.4				8.461	15.230
Same (taken from 4 cars while being loaded at the mine).	182	W31141	C	1	1.4	28.9	53.0	16.7	.60	6.633	12.480
	2			2	29.3	53.8	16.9			7.033	12.630
	3			3	35.3	61.7				8.461	15.230

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.					Ultimate.					Calorific value.	
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
COLORADO—Continued.																
LAS ANIMAS COUNTY—continued.																
Primero; secs. 23, 24, 25, and 26, T. 33 S., R. 66 W.; First West Primero mine, Primero bed (taken from same cuts as sample 31141).	182	W31142	C	1	1.3	28.6	52.3	17.8	0.60						6,828	12,290
				2		29.0	53.0	18.0	.60						6,922	12,460
				3		35.4	64.6		.73						7,403	13,190
Primero mine, Primero bed (face of room 1 off second blind back entry, 5-foot 10-inch bed and cut).	180	12025	A	2	2.36	31.07	56.02	9.92	.59	5.06	74.54	1.65	8.24	1.6	7,085	13,833
				1		31.82	58.02	10.16	.60	4.92	76.34	1.69	6.29		8,554	15,397
				3		35.42	64.58		.67	5.48	84.97	1.88	7.00	3.0		
Same (face of first west slope, 1,500 feet from mouth).	180	12027	A	1	3.98	27.96	50.50	17.56	.51							
				2		20.12	52.59	18.29	.65							
				3		35.64	64.36		.65							
Starkville; Starkville mine, Engle-Starkville bed (rib of west entry 8, 30 feet outby shant from new entry, 7-foot 2½-inch bed, 6-foot 9½-inch cut).	182	11134	A	1	2.07	20.75	55.56	13.22	.57	4.64	71.77	1.15	8.65	.8	7,139	12,850
				2		29.77	56.73	13.50	.58	4.50	73.28	1.17	6.97		7,290	13,122
				3		34.42	65.58		.67	5.20	84.72	1.35	8.06		8,428	15,170
Same (south entry 3, near second crosscut off new entry, 2-foot 11½-inch cut).	182	11135	A	1	1.79	28.67	55.33	14.47	.62	4.69	71.76	1.15	7.57	.8	7,074	12,733
				2		29.19	56.34	14.21	.63	4.57	73.07	1.17	6.09		7,203	12,965
				3		34.13	65.87		.74	5.34	85.43	1.37	7.12	.7	8,422	15,160
Same (entry 1-5 between rooms 26 and 27, on pillar, 15,000 feet southwest of mine mouth, 5-foot 9-inch bed and cut).	182	12196	A	1	1.81	31.16	55.49	11.54	.60							
				2		31.73	56.52	11.75	.61							
				3		35.95	64.05		.69							
Same (face of south entry 1, 1,200 feet southeast of mine mouth, 4-foot 2-inch cut).	182	12197	A	1	2.97	25.80	49.80	21.34	.54					1.8		
				2		26.68	51.33	21.99	.56							
				3		31.20	65.80		.72							
Same (composite of samples 12196 and 12197)	183	12198	A	1	2.50	28.85	52.09	16.56	.55	4.79	69.12	1.10	7.88	1.3	6,881	12,386
				2		29.59	53.43	16.98	.56	4.63	70.89	1.13	5.81		7,057	12,703
				3		35.64	64.36		.67	5.58	85.39	1.36	7.00		8,500	15,300
Tollerburg; Toller mine, Berwind bed; (face of slope, 2,500 feet from shaft bottom, 7-foot bed and cut).	183	13253	A	1	6.31	30.15	49.45	14.09	.65	5.10	67.46	1.31	11.39	5.5	6,747	12,145
				2		32.18	52.78	15.04	.69	4.70	72.00	1.40	6.17		7,201	12,982
				3		37.88	62.12		.81	5.53	84.74	1.65	7.27		8,476	15,257
Same (face of north entry 5, 3,000 feet from shaft bottom, 7-foot bed and cut).	183	13254	A	1	5.43	33.01	52.93	8.63	.63	5.46	72.98	1.35	10.95	4.6	7,354	13,297
				2		33.90	55.97	9.13	.67	5.14	77.17	1.43	6.46		7,776	13,967
				3		38.41	61.59		.74	5.66	84.93	1.57	7.10		8,557	15,403

MESA COUNTY.

Grand Junction, 1 mile south of; sec. 26, T. 1 S., R. 1 W.; prospect (in entry, about 125 feet from opening, 3-foot 11-inch bed, 1-foot 11-inch cut).
Same (in entry, about 125 feet from opening, 2-foot 10-inch bed, 10-inch cut).

5 miles southeast of; sec. 5, T. 2 S., R. 1 E.; prospect (in entry, 100 feet from opening, 2-foot 6-inch bed, cut taken from upper 15 inches).
Same (position and bed same as sample 11104, cut taken from lower 12 inches).

MOFFAT COUNTY.

Axial, 6 miles west of; NW, $\frac{1}{4}$ sec. 14, T. 4 N., R. 94 W.; Battle Bra mine (in main entry, 130 feet north of mine mouth; 11-inch 6-inch bed, 11-foot cut).

$5\frac{1}{2}$ miles northwest of; sec. 13, T. 4 N., R. 94 W.; Ed Colom mine (75 feet northwest of opening, 13-foot 6-inch bed and cut).

Sec. 14, T. 3 N., R. 93 W.; James mine (in main entry, 100 feet north of opening, 6-foot 4-inch bed and cut).

$1\frac{1}{2}$ miles south of; sec. 2, T. 3 N., R. 93 W.; Joe Collom mine, Collom bed (in mine, 400 feet northwest of mine mouth; 20-foot 1-inch bed, 8-foot 11-inch cut).

2 miles east of; sec. 31, T. 4 N., R. 92 W.; Shater mine (189 feet northeast of the mine mouth, 14-foot bed, 13-foot 9-inch cut).

Craig, 3 miles southeast of; Walker mine (face of main entry, 300 feet west of mine mouth, 8-foot bed).

MONTEZUMA COUNTY.

Cortez, one-half mile west of 12 miles southwest of Dolores; sec. 23, T. 36 N., R. 16 W.; Cortez mine, lowest bed in Dakota formation (in tunnel, 90 feet from mouth, 4-foot 8½-inch bed, 1-foot 7-inch cut). 16 miles southwest of; sec. 3, T. 35 N., R. 18 W.; Hamilton prospect, Dakota formation (near surface in open cut, 2-foot 8-inch bed, 1-foot 7-inch cut).

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.					Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Con- di- tion.	Moi- s- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
COLORADO—Continued.																	
MONTEZUMA COUNTY—continued.																	
Cortez, 10 miles southeast of; S.W. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 33, T. 35 N., R. 16 W.; Jackson mine, lower bed of Mesa- verde formation, probably Spencer (face of room 4 off north main entry, 200 feet from open- ing, 2-foot 10-inch bed and cut).	188	16472	A	1	12.20	41.33	40.38	6.09	0.44					4.1	6,309	11,356	
				2		47.07	45.99	6.94	.50						7,186	12,935	
				3		50.58	49.42		.54							7,722	13,900
Same (face of main entry, 170 feet north from open- ing, 2-foot 7-inch bed and cut).	188	16473	A	1	12.31	42.23	40.51	4.95	.48					3.8	6,399	11,518	
				2		48.16	46.20	5.64	.55						7,267	13,135	
				3		51.04	48.96		.58						7,733	13,919	
Same (face of south entry, 95 feet from opening, 5-foot 3-inch bed, 2-foot 7-inch cut).	188	16474	A	1	13.79	40.67	39.93	5.61	.49					4.9	6,176	11,117	
				2		47.18	46.31	6.51	.57						7,164	12,845	
				3		50.46	49.54		.61						7,663	13,793	
Same (composite of samples 16472, 16473, and 16474).	189	16475	A	1	12.77	41.34	40.24	5.65	.50	6.10	63.47	1.34	22.94	4.3	6,310	11,538	
				2		47.39	46.13	6.48	.57	5.37	72.76	1.54	13.28		7,234	13,021	
				3		50.67	49.33		.61	5.74	77.80	1.65	14.20		7,735	13,923	
14 miles southeast of; sec. 35, T. 36 N., R. 16 W.; Mowry mine, Dakota formation (near face, 75 feet from mine mouth, 2-foot 8-inch bed, 2-foot 2-inch cut).	189	12586	B	1	4.84	34.56	42.30	18.30	7.56	4.85	59.90	1.11	8.28	3.1	6,147	11,065	
				2		36.32	44.45	19.23	7.94	4.53	62.95	1.17	4.18		6,460	11,628	
				3		44.97	55.03		9.83	5.61	77.94	1.45	5.17		7,998	14,396	
Same (in main entry, 100 feet from mine mouth, 2-inch cut).	189	16479	A	1	3.89	37.01	46.58	12.52	7.04	4.96	66.19	1.16	8.13	2.4	6,856	12,341	
				2		38.51	48.46	13.03	7.33	4.71	68.87	1.21	4.85		7,134	12,841	
				3		44.28	55.72		8.43	5.42	79.19	1.39	5.57		8,203	14,765	
7 miles from; sec. 25, T. 35 N., R. 16 W.; Todd mine, lowest bed of Mesaverde formation (face of room 9; 340 feet from entry mouth, 2-foot 10-inch bed and cut).	190	16476	A	1	10.97	40.30	42.28	6.45	.81					3.7	6,402	11,632	
				2		45.26	47.50	7.24	.91						7,258	13,064	
				3		48.79	51.21		.98						7,825	14,085	
Same (face of room 10; 330 feet from entry mouth, 3-foot bed and cut).	190	16477	A	1	13.07	39.62	39.72	7.59	.65					5.1	6,194	11,149	
				2		45.57	45.70	8.73	.75						7,125	12,825	
				3		49.93	50.07		.82						7,806	14,051	
Same (composite of samples 16476 and 16477) ...	190	16478	A	1	12.05	39.65	41.27	7.03	.73	5.88	63.43	1.38	21.55	4.4	6,310	11,358	
				2		45.08	46.93	7.99	.83	5.16	72.12	1.57	12.33		7,174	12,913	
				3		48.99	51.01		.90	5.61	78.38	1.71	13.40		7,797	14,035	

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.					Ultimate.					Calorific value.	
		Laboratory No.	Kind.	Con- dition.	Mois- ture.	Vola- tile mat- ter.	Fixed carbon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- loss.	Cabo- rific values.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
IDAHO—Continued.																
CASSIA COUNTY.																
Oakley, 22 miles southwest of; sec. 26 (unsurveyed), T. 16 S., R. 20 E.; Worthington mine, Worthington bed (200 feet from slope mouth).	195	12643	B	1 2 3	31.46 40.30 55.62	26.41 40.30 55.62	21.08 32.16 44.38	18.05 27.54	0.63 .96 1.32					26.1	3,229 4,927 6,800	5,812 8,869 12,210
FREMONT COUNTY.																
Hadon, 10 miles southwest of; sec. 25, T. 5 N., R. 43 E.; Brown Bear mine (end of north entry, 950 feet from portal; 5-foot 3-inch bed, 5-foot cut).	196	15115	B	1 2 3	11.15 12.66 41.21	37.24 42.84 41.21	47.01 46.86 55.70	4.30 4.86	.51 .61	5.94 5.27 5.54	68.09 76.89	1.40 1.58 1.66	19.73 10.79 11.34	8.3	6,719 7,588 7,976	12,094 13,658 14,357
10 miles south of; sec. 6, T. 4 N., R. 44 E.; Horse- shoe mine (in entry, 200 feet from portal, 11-foot 1-inch bed, 8-foot 6-inch cut).	196	15116	B	1 2 3	7.71 43.02 41.06	39.68 51.02 55.34	50.58 51.02 55.34	2.18 2.36	.38 .41 .42					4.3	7,155 7,757 7,945	12,879 13,963 14,301
ILLINOIS.																
MADISON COUNTY.																
Collinsville, 1 mile east of; Canine No. 3 mine, No. 6 bed (rib, 10 feet from face of west entry 10, off north heading, 3,200 feet northwest of shaft, 7-foot 8½-inch bed, 7-foot 5½-inch cut).	197	10456	A	1 2 3	12.94 41.07 46.02	35.76 41.07 46.02	41.92 48.16 53.98	9.38 10.77	3.65 4.19 4.70					6.0	6,096 7,002 7,846	10,973 12,004 14,123
Same (face of first stub on east entry 8, off north heading, 4,200 feet north of shaft, 6-foot 10½-inch bed, 6-foot 6½-inch cut).	197	10457	A	1 2 3	12.31 42.84 47.76	37.57 42.84 47.76	41.09 46.86 52.24	9.03 10.30	3.58 4.08 4.55					5.4	6,175 7,042 7,850	11,155 12,676 14,130
Same (rib, 8 feet from face of east entry 7, on south heading, 2,500 feet southeast of shaft, 7-foot 7½-inch bed, 7-foot 5½-inch cut).	197	10458	A	1 2 3	12.81 41.64 46.75	36.31 41.64 46.75	41.35 41.64 53.25	9.53 10.93	3.28 3.76 4.22					5.4	6,124 7,023 7,885	11,023 12,641 14,193
Same (composite of samples 10456, 10457, 10458)...	197	10459	A	1 2 3	12.70 41.65 46.72	36.36 41.65 46.72	41.47 47.50 53.28	9.47 10.85	3.67 4.20 4.71	5.81 5.04 5.65	60.91 69.77 78.26	.99 1.13 1.27	19.15 9.01 10.11	5.6	6,105 6,993 7,844	10,989 12,587 14,119

MONTGOMERY COUNTY;

Panama, 1 mile north of; Panama No. 1 mine, No. 6 bed (face of room 1, third south stub, off southeast entry 3, about 2,000 feet from shaft).
Same (face of room 4, third north stub, off west entry 6, off north entry, 2,000 feet from shaft).
Same (composite of samples 11352 and 11353).....

SALINE COUNTY.

Harrisburg, 1 mile south of; O'Gara No. 9 mine, No. 5 bed (between rooms 18 and 19, face of west entry 3, off main south entry, 3,000 feet from mine mouth, 7-foot 5-inch bed, 7-foot 3-inch cut). Same (face of second crosscut in room 11, off west entry 3, off main south entry, 6-foot 71-inch bed, 6-foot 7-inch cut).

VERMILION COUNTY.

Westville, 2 miles south of; sec. 19, T. 18 N., R. 11 W.; Little Vermilion mine, No. 6 bed ("Run-of-mine" shipped to Pittsburgh station for testing purposes).

INDIANA.

SULLIVAN COUNTY.

Dugger, $\frac{1}{2}$ miles southwest of: Vandalia No. 10 mine, No. 4 bed (face of room 2, east entry 6, off north entry 2, off main east entry, 5-foot 5½-inch bed, 5-foot 2½-inch cut).
Same (face of room 12, off east entry 6, off north entry 2, off main east entry, 5-foot 3½-inch bed, 5-foot 4-inch cut).

WARRICK COUNTY.

Elberfeld, 1 mile south of; Elberfeld mine, No. 5 bed (in new manway, off main west entry, 200 feet north of shaft bottom, 4-foot $\frac{1}{2}$ -inch bed and cut).

KANSAS.

CRAWFORD COUNTY.

Franklin, $\frac{1}{2}$ mile west of; Western No. 16 mine, Weir-Pittsburg bed (2,000 feet southwest of shaft, 35-inch bed and cut).

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.					Ultimate.				Calorific value.		
		Laboratory No.	Kind.	Con- dition.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- rific units.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
KANSAS—Continued.																
CRAWFORD COUNTY—continued.																
Fuller, southwest corner of; sec. 12, T. 29 N., R. 25 E.; Sheridan No. 2 mine (face, 2,500 feet southwest of shaft, 3-foot bed, 2-foot 11-inch cut).	201	11181	A	1	5.04	23.05	52.38	9.53	5.10					3.5		
				2		34.80	55.16	10.04	5.37							
				3		38.68	61.32		5.97							
Same (face, 2,500 feet northeast of shaft, 3-foot bed, 2-foot 11-inch cut).	201	11182	A	1	4.72	33.35	52.85	9.08	5.19					3.3		
				2		35.00	55.47	9.53	5.45							
				3		38.69	61.31		6.02							
Same (face, 2,500 feet northwest of shaft, 3-foot bed, 2-foot 11-inch cut).	201	11183	A	1	5.00	33.97	52.37	8.66	4.64					3.5		
				2		35.76	55.12	9.12	4.88							
				3		39.35	60.65		5.37							
Same (composite of samples 11181, 11182, and 11183).	201	11184	A	1	4.85	33.53	52.52	9.10	4.95	5.08	71.20	1.24	8.43	3.4	7,190	12,042
				2		35.24	55.20	9.56	5.20	4.77	74.83	1.30	4.34		7,557	13,003
				3		38.96	61.04		5.75	5.27	82.74	1.44	4.80		8,356	15,041
Yale, 3 mile northwest of; sec. 26, T. 30 N., R. 25 E.; Western No. 13 mine (face, 2,600 feet north of shaft, 3-foot bed, 2-foot 11½-inch cut).	202	11209	A	1	5.25	31.26	49.22	14.27	5.15					3.7		
				2		32.09	51.05	15.06	5.44							
				3		38.84	61.16		6.40							
Same (face, 2,800 feet southeast of shaft, 3-foot bed, 2-foot 11½-inch cut).	202	11210	A	1	5.64	32.87	50.08	10.51	4.25					4.1		
				2		34.84	54.02	11.14	4.50							
				3		39.21	60.79		5.06							
Same (face, 2,800 feet southwest of shaft, 3-foot bed, 2-foot 11½-inch cut).	202	11211	A	1	5.83	31.37	51.29	11.51	4.99					4.3		
				2		33.31	54.47	12.22	5.30							
				3		37.95	62.05		6.04							
Same (composite of samples 11209, 11210, and 11211).	202	11212	A	1	5.55	32.54	49.74	12.17	4.88	5.08	67.06	1.14	9.07	4.0	6,847	12,325
				2		34.45	52.66	12.89	5.17	4.72	71.64	1.21	4.37		7,250	13,050
				3		39.55	60.45		5.94	5.42	82.24	1.39	5.01		8,323	14,981
LEAVENWORTH COUNTY.																
Lansing; sec. 19, T. 9 S., R. 23 E.; Penitentiary mine, Beaver bed (in mine, 1,100 feet south and 1,400 feet east of shaft, 1-foot 10-inch bed and cut).	202	12841	B	1	11.04	34.53	41.01	13.42	5.07					8.3		
				2		38.82	46.09	15.09	5.70							
				3		45.72	54.28		6.71							

[illegible]

206	16674	A	Graham, 2 miles north of; Skibo mine, No. 9 bed (face of west entry 2, off north entry 1, 4,000 feet north of pit mouth, 4-foot 10-inch bed and cut). Same (face of room 2, off east entry 7, 3,600 feet northeast of pit mouth, 4-foot 9-inch bed).	1	8.81	36.15	46.43	8.61	3.55	5.31	65.34	1.47	15.72	5.4	6,612	11,902
				2	.....	39.64	50.92	9.44	3.89	4.76	71.65	1.61	8.65	.....	7,251	13,052
				3	.....	43.77	56.23	.....	4.30	5.26	79.12	1.78	9.54	.....	8,007	14,413
206	16675	A		1	8.21	36.39	45.34	10.06	3.33	5.36	65.22	1.55	14.48	5.1	6,543	11,777
				2	.....	39.64	49.40	10.96	3.63	4.85	71.05	1.69	7.82	.....	7,128	12,830
				3	.....	44.52	55.48	.....	4.08	5.45	79.80	1.90	8.77	.....	8,005	14,409
OHIO COUNTY.																
207	15102	A	McHenry, near; McHenry mine, No. 9 bed (face of room 4, off south entry 3, 9,000 feet from mine mouth, 4-foot 6-inch bed).	1	9.89	35.94	43.36	10.81	3.64	5.37	62.27	1.33	16.58	7.0	6,329	11,392
				2	.....	39.89	48.11	12.00	4.04	4.74	69.11	1.48	8.63	.....	7,024	12,643
				3	.....	45.33	54.67	.....	4.39	5.39	78.54	1.68	9.80	.....	7,982	14,368
207	15103	A	Same (room 1, off north entry 4, 8,500 feet from mine mouth, 4-foot 6-inch bed).	1	9.97	36.54	44.93	8.56	2.62	5.49	65.01	1.40	16.92	7.0	6,540	11,772
				2	.....	40.58	49.91	9.51	2.91	4.86	72.21	1.55	8.96	.....	7,264	13,075
				3	.....	44.84	55.16	.....	3.22	5.37	79.80	1.71	9.90	.....	8,027	14,449
PIKE COUNTY.																
207	12004	B	Hellier, 1 mile southeast of; Edgewater mine, Upper Elk-horn bed (sample taken at mine from three loaded railroad cars).	1	1.94	35.48	59.88	2.70	.57	5.38	81.37	1.42	8.56	.5	8,163	14,693
				2	.....	36.18	61.07	2.75	.58	5.26	82.98	1.45	6.98	.....	8,325	14,985
				3	.....	37.20	62.80	.....	.60	5.41	85.33	1.49	7.17	.....	8,561	15,410
MISSOURI.																
ADAIR COUNTY.																
207	14799	B	Kirksville, $\frac{1}{2}$ mile west of; sec. 8, T. 63 N., R. 15 W.; Star mine, Tebo (?) bed (in mine, 30 feet south of shaft, 1-foot 54-inch bed).	1	15.98	38.15	37.18	8.69	4.12	5.90	59.09	.94	21.26	11.0	5,999	10,798
				2	.....	45.41	44.25	10.34	4.90	4.90	70.33	1.12	8.41	.....	7,140	12,852
				3	.....	50.55	49.35	.....	5.46	5.46	78.44	1.25	9.39	.....	7,963	14,333
207	14800	B	Same (in mine, 12 feet northeast of shaft, 1-foot 8-inch bed).	1	13.94	37.80	38.11	10.15	5.95	5.71	58.76	1.01	18.42	9.4	6,028	10,850
				2	.....	43.92	44.29	11.79	6.91	4.83	68.28	1.17	7.02	.....	7,005	12,609
				3	.....	49.79	50.21	.....	7.83	5.48	77.41	1.33	7.95	.....	7,942	14,296
AUDRAIN COUNTY.																
208	11483	A	Martinsburg, $\frac{1}{2}$ mile west of; sec. 14, T. 50 N., R. 7 W.; No. 1 mine; Mulky bed (long-wall face, 600 feet south of shaft), 2-foot 6-inch bed and cut.)	1	11.73	37.18	38.00	13.09	5.07	.....	.....	.....	.....	10.5	.....	.....
				2	.....	42.12	43.05	14.83	5.74	.....	.....	.....	.....	.....	.....	.....
				3	.....	49.45	50.55	.....	6.74	.....	.....	.....	.....	.....	.....	.....
208	11484	A	Same (long-wall face, 600 feet southwest of shaft, 2-foot 6-inch cut).	1	8.71	40.73	39.92	10.64	5.27	.....	.....	.....	.....	7.4	.....	.....
				2	.....	44.62	43.72	11.66	5.77	.....	.....	.....	.....	.....	.....	.....
				3	.....	50.51	49.49	.....	6.53	.....	.....	.....	.....	.....	.....	.....
208	11485	A	Same (face, 800 feet southwest of shaft, 2-foot 6-inch cut).	1	9.75	39.12	39.37	11.76	4.88	.....	.....	.....	.....	8.5	.....	.....
				2	.....	43.34	43.63	13.03	5.41	.....	.....	.....	.....	.....	.....	.....
				3	.....	49.83	50.17	.....	6.22	.....	.....	.....	.....	.....	.....	.....
208	11478	A	Same (composite of samples 11483, 11484, and 11485).	1	10.06	38.65	39.67	11.62	5.16	5.43	60.84	.83	16.12	8.8	6,192	11,146
				2	.....	42.97	44.11	12.92	5.74	4.79	67.65	.92	7.98	.....	6,885	12,393
				3	.....	49.35	50.65	.....	6.59	5.50	77.69	1.06	9.16	.....	7,907	14,233

Table of chemical analyses—Continued.

Mine notes (page).	Locality, bed, etc.	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Con- diti- on.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
2	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
MISSOURI—Continued.																
BARTON COUNTY.																
208	Mindeemines, 2 miles northwest of; sec. 30, T. 32 N., R. 33 W.; No. 17 mine; War-Pittsburg Lower bed (face, 1,000 feet northeast of shaft, 2-foot 10-inch bed and cut).	11185	A	1	6.26	30.13	51.51	12.10	5.45					4.7		
208	Same (face, 1,000 feet southeast of shaft, 2-foot 10-inch bed and cut).	11186	A	2	6.07	32.05	52.22	9.05	4.14					4.6		
208	Same (face, 1,500 feet northwest of shaft, 2-foot 10-inch bed and cut).	11187	A	3	5.13	31.97	49.74	13.16	4.88					3.7		
208	Same (composite of samples 11185, 11186, and 11187).	11188	A	3	5.87	30.98	51.67	11.48	5.00	5.07	67.64	1.09	9.72	4.3	6,835	12,339
209	1 mile northeast of; sec. 28, T. 32 N., R. 33 W.; Pullen No. 1 mine, War-Pittsburg Lower bed (south face, 600 feet from shaft, 2-foot 6-inch bed and cut).	11177	A	2	5.30	32.26	53.89	8.46	6.05	5.35	81.84	1.32	4.78	4.2	7,282	13,108
209	Same (west face, 400 feet from shaft, 2-foot 7-inch bed and cut).	11178	A	3	5.42	32.65	52.13	9.80	3.75					4.2	8,294	14,929
209	Same (northeast face, 600 feet from shaft, 2-foot 6-inch bed and cut).	11179	A	3	5.54	32.34	53.40	8.72	3.39					4.2		
209	Same (composite of samples 11177, 11178, and 11179)	11180	A	3	5.43	32.06	53.56	8.95	3.06	5.38	71.58	1.37	9.10	4.2	7,218	12,992
209	Amsterdam, southern part of; sec. 20, T. 41 N., R. 33 W.; No. 1 mine, Mulberry bed (face, 400 feet east of shaft, 2-foot 6-inch bed and cut).	11306	A	1	9.82	31.23	42.57	16.38	4.09					8.2	7,432	13,734
				2		34.63	47.21	18.16	4.54						8,430	15,174
				3		42.31	57.69		5.55							

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.					Ultimate.					Calorific value.	
		Laboratory No.	Kind.	Con-dition.	Mois-ture.	Vola-tile mat-ter.	Fixed car-bon.	Ash.	Sul-phur.	Hy-dro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.	Air-dry-ing loss.	Calo-ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
MISSOURI—Continued.																
HENRY COUNTY—continued.																
Lewis, $\frac{1}{2}$ mile north of, sec. 9, T. 42 N., R. 25 W.; Pigg No. 1 mine, Tebo bed (face, 1,300 feet west of shaft).	216	11267	A	1	11.91	33.31	39.98	14.80	4.86	.....	.....	.....	.....	10.2	.....	.....
Same (face, 1,300 feet southwest of shaft, 2-foot 6-inch bed and cut).	216	11268	A	2	.....	37.81	45.39	16.80	5.52	.....	.....	.....	.....	.....	.....	.....
Same (face, 1,300 feet southwest of shaft, 2-foot 6-inch bed and cut).	216	11269	A	3	11.08	36.28	39.96	12.68	3.82	.....	.....	.....	.....	9.4	.....	.....
Same (face, 1,400 feet southwest of shaft, 2-foot 6-inch bed and cut).	216	11270	A	1	11.04	40.80	44.94	14.25	4.30	.....	.....	.....	.....	9.3	.....	.....
Same (face, 1,400 feet southwest of shaft, 2-foot 6-inch bed and cut).	216	11270	A	2	.....	47.59	52.41	10.37	3.39	.....	.....	.....	.....	.....	.....	.....
Same (face, 1,400 feet southwest of shaft, 2-foot 6-inch bed and cut).	216	11270	A	3	.....	38.03	40.56	11.66	3.81	.....	.....	.....	.....	.....	.....	.....
Same (composite of samples 11267, 11268, and 11269, 2-foot 6-inch bed and cut).	216	11270	A	1	11.44	42.75	45.59	12.76	4.25	5.53	39.88	0.95	16.63	9.6	6,117	11,011
				2	.....	34.67	41.13	12.76	4.80	4.81	67.62	1.07	7.29	.....	6,907	12,433
				3	.....	45.74	54.26	14.41	5.61	5.62	79.01	1.25	8.51	.....	8,070	14,526
LINN COUNTY.																
Brookfield, $\frac{1}{2}$ miles east of, sec. 20, T. 57 N., R. 19 W.; Crandall No. 1 mine, Tebo bed (face, 750 feet southeast of shaft, 2-foot 5-inch bed, 2-foot 2-inch cut).	217	11421	A	1	14.78	36.64	38.23	10.35	4.62	.....	.....	.....	.....	12.7	.....	.....
Same (face, 750 feet southwest of shaft, 2-foot 5-inch bed, 2-foot 2-inch cut).	217	11422	A	2	.....	42.99	44.87	12.14	5.42	.....	.....	.....	.....	.....	.....	.....
Same (face, 750 feet southwest of shaft, 2-foot 5-inch bed, 2-foot 2-inch cut).	217	11422	A	3	.....	48.93	51.07	.....	6.17	.....	.....	.....	.....	.....	.....	.....
Same (face, 800 feet east of shaft, 2-foot 5-inch bed, 2-foot 2-inch cut).	217	11423	A	1	14.46	36.99	41.19	7.36	4.28	.....	.....	.....	.....	12.2	.....	.....
Same (face, 800 feet east of shaft, 2-foot 5-inch bed, 2-foot 2-inch cut).	217	11423	A	2	.....	43.24	48.16	8.60	5.00	.....	.....	.....	.....	.....	.....	.....
Same (face, 800 feet east of shaft, 2-foot 5-inch bed, 2-foot 2-inch cut).	217	11423	A	3	.....	47.31	52.69	.....	5.47	.....	.....	.....	.....	.....	.....	.....
Same (face, 800 feet east of shaft, 2-foot 5-inch bed, 2-foot 2-inch cut).	217	11424	A	1	15.81	36.18	41.45	6.56	3.78	.....	.....	.....	.....	13.7	.....	.....
Same (face, 800 feet east of shaft, 2-foot 5-inch bed, 2-foot 2-inch cut).	217	11424	A	2	.....	42.97	49.24	7.79	4.87	.....	.....	.....	.....	.....	.....	.....
Same (face, 800 feet east of shaft, 2-foot 5-inch bed, 2-foot 2-inch cut).	217	11424	A	3	.....	46.60	53.40	.....	4.87	.....	.....	.....	.....	.....	.....	.....
Same (composite of samples 11421, 11422, and 11423).	217	11424	A	1	15.09	36.05	40.71	8.15	4.21	5.81	60.67	99	20.17	12.9	6,100	10,980
				2	.....	42.46	47.04	9.60	4.96	4.86	71.45	1.17	7.96	.....	7,184	12,931
				3	.....	46.97	53.03	.....	5.49	5.38	79.04	1.29	8.80	.....	7,947	14,805

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.					Ultimate.					Calorific value.	
		Laboratory No.	Kind.	Con-dition.	Mols-ture.	Vol-atile ter.	Fixed car-bon.	Ash.	Sul-phur.	Hy-dro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.	Air-dry-ing loss.	Calo-ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
MISSOURI—Continued.																
RANDOLPH COUNTY.																
Huntsville, southern part of; sec. 36, T. 54 N., R. 15 W.; Carson No. 1 mine, Bevier bed (face, 250 feet southeast of shaft, 4-foot bed and cut).	219	11452	A	1	13.35	35.06	41.32	10.27	5.56					11.5		
				2		40.46	47.69	11.85	6.42							
				3		45.90	54.10		7.28							
Same (face, 300 feet north of shaft, 4-foot bed and cut).	219	11453	A	1	13.36	34.79	42.02	9.83	5.20					11.5		
				2		40.15	48.50	11.35	6.00							
				3		45.29	54.71		6.77							
Same (face, 200 feet southwest of shaft, 4-foot bed and cut).	219	11454	A	1	13.31	34.71	41.67	10.33	5.12					11.6		
				2		40.04	48.07	11.89	5.91							
				3		43.44	54.56		6.71							
Same (composite of samples 11452, 11453, and 11454).	219	11455	A	1	13.23	34.99	41.33	10.25	3.19	5.58	60.25	0.92	17.81	11.5	6,101	10,862
				2		40.33	47.86	11.81	3.98	4.74	69.44	1.06	6.97		7,031	12,656
				3		45.73	54.27		6.78	5.37	78.74	1.20	7.91		7,972	14,350
$\frac{3}{4}$ mile south of; sec. 36, T. 54 N., R. 15 W.; Northern No. 2 mine, Bevier bed (face, 4,000 feet south of shaft, 4-foot bed and cut).	219	11448	A	1	12.46	36.94	42.80	7.80	2.99					10.6		
				2		42.20	48.89	8.91	3.42							
				3		46.33	53.67		3.75							
Same (face, 3,800 feet northeast of shaft, 4-foot bed and cut).	219	11449	A	1	13.03	35.75	41.82	9.40	3.34					11.2		
				2		41.11	48.08	10.81	4.99							
				3		46.09	53.91		5.59					8.4		
Same (face, 3,500 feet southeast of shaft, 4-foot bed and cut).	219	11450	A	1	10.53	36.50	43.90	9.07	4.46							
				2		40.80	49.06	10.14	4.98							
				3		45.40	54.60		5.54							
Same (composite of samples 11448, 11449, and 11450).	220	11451	A	1	12.12	36.32	42.88	8.68	3.92	5.58	63.32	1.02	17.48	10.1	6,363	11,453
				2		41.33	48.79	9.88	4.46	4.81	72.05	1.16	7.64		7,240	13,032
				3		45.86	54.14		4.95	5.34	79.95	1.29	8.47		8,034	14,461
Reinick, $\frac{1}{4}$ mile west of; sec. 31, T. 53 N., R. 13 W.; Orris No. 1 mine; Mulky bed (face, 300 feet southwest of shaft, 18-inch bed and cut).	220	11497	A	1	9.82	38.15	43.08	8.95	4.68					7.9		
				2		42.30	47.78	9.92	5.20							
				3		46.96	53.04		5.77							
Same (face, 300 feet northwest of shaft, 18-inch bed and cut).	220	11498	A	1	7.38	41.09	43.68	7.85	4.04					5.1		
				2		44.36	47.16	8.48	4.36							
				3		48.47	51.53		4.76							

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.					Ultimate.				Calorific value.		
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
MONTANA.	222	*14782	B	1	18.77	31.48	40.40	9.35	0.73						5.075	9,135
				2	.....	38.76	49.73	11.51	.90						6.218	11,246
				3	.....	43.80	56.20	.....	1.02						7.061	12,710
BLAINE COUNTY.	222	*15151	A	1	9.94	35.05	43.82	11.19	1.75						5.897	10,615
				2	.....	38.92	48.65	12.43	1.94						6.548	11,786
				3	.....	44.44	55.56	.....	2.22						7.477	13,459
CARBON COUNTY.	222	*15145	A	1	10.07	34.78	44.10	11.05	1.83						5.935	10,683
				2	.....	38.68	49.03	12.29	2.03						6.600	11,890
				3	.....	44.10	55.90	.....	2.31						7.525	13,545
Bear Creek, 1½ miles west of sec. 6, T. 8 S., R. 21 E.; No. 2 mine, No. 2 bed (pillar between rooms 9 and 10, off north entry 2, 6-foot 2½-inch bed and cut). Same (position, bed, and cut same as sample 15151).	222	*15146	A	1	10.39	34.12	47.56	7.93	1.31						6.096	10,973
				2	.....	38.07	53.08	8.85	1.46						6.803	12,245
				3	.....	41.77	58.23	.....	1.60						7.464	13,435
Same (position, bed, and cut same as sample 15146).	222	*15152	A	1	10.40	34.66	46.68	8.26	1.28						6.095	10,971
				2	.....	38.68	52.10	9.22	1.43						6.803	12,245
				3	.....	42.61	57.39	.....	1.58						7.494	13,489
Same (face of room 9 off east entry 9; 45 feet in from entry; 5-foot 6½-inch bed and cut).	222	*15147	A	1	10.66	35.18	44.79	9.37	1.66						5.958	10,724
				2	.....	39.38	50.13	10.49	1.80						6.689	12,004
				3	.....	41.00	56.00	.....	2.08						7.451	13,412
Same (position, bed, and cut same as sample 15147).	222	*15153	A	1	10.67	34.75	45.13	9.45	1.65						5.950	10,710
				2	.....	38.90	50.52	10.58	1.85						6.660	11,988
				3	.....	43.50	56.50	.....	2.07						7.448	13,406
Same (face of last crosscut, just started, in room 22, off east entry 4; 6-foot 3½-inch bed and cut).	222	*15148	A	1	11.07	34.11	46.67	8.15	1.47						6.028	10,850
				2	.....	38.36	52.48	9.16	1.65						6.778	12,200
				3	.....	42.23	57.77	.....	1.82						7.461	13,430
Same (position, bed, and cut same as sample 15148).	222	*15154	A	1	11.11	33.65	46.89	8.35	1.44						6.010	10,818
				2	.....	37.86	52.75	9.39	1.62						6.761	12,170
				3	.....	41.78	58.22	.....	1.79						7.461	13,430

Same (face of room 11, off rock tunnel entry, 35 feet in from entry, 5-foot 9-inch bed and cut).	222	*15149	A	1	10.80	35.06	44.02	10.12	1.82	.....	.....	.....	3.8	5.885	10.593
	2			2	39.31	49.34	11.55	2.04	2.30	.....	.....	.....	.....	6.598	11.876
	3			3	44.34	55.66	.....	2.30	2.30	.....	.....	.....	.....	7.443	13.397
Same (position, bed, and cut same as sample 15149).	222	*15155	A	1	10.75	35.19	43.60	10.46	1.80	.....	.....	.....	3.9	5.861	10.580
	2			2	.....	39.43	48.85	11.72	2.02	.....	.....	.....	.....	6.567	11.821
	3			3	.....	44.67	55.35	.....	2.29	.....	.....	.....	.....	7.439	13.390
Same (composite of samples 15146, 15147, 15148, and 15149).	223	*15150	A	1	10.66	35.29	45.14	8.91	1.58	5.55	61.22	1.58	3.7	5.986	10.775
	2			2	.....	39.50	50.53	9.97	1.77	4.89	68.52	1.77	.....	6.700	12.060
	3			3	.....	43.87	56.13	.....	1.97	5.43	76.11	1.97	.....	7.442	13.396
Same (composite of samples 15152, 15153, 15154, and 15155).	223	*15156	A	1	10.65	34.10	46.11	9.14	1.53	5.40	60.87	1.58	3.7	5.997	10.795
	2			2	.....	38.16	51.61	10.23	1.71	4.83	68.13	1.77	.....	6.712	12.082
	3			3	.....	42.51	57.49	.....	1.90	5.38	75.90	1.97	.....	7.477	13.459
Secs. 5 and 6, T. 8 S., R. 21 E., North Side mine, No. 3 bed (last pillar on second west main entry, 500 feet from drift mouth, 5-foot 6-inch bed and cut).	224	*15143	A	1	10.23	34.96	45.95	8.86	1.55	.....	.....	.....	3.5	6.120	11.016
	2			2	.....	38.95	51.18	9.87	1.73	.....	.....	.....	.....	6.818	12.272
	3			3	.....	43.22	56.78	.....	1.92	.....	.....	.....	.....	7.565	13.617
Same (position, bed, and cut same as sample 15143).	224	*15144	A	1	10.12	34.54	46.63	8.71	1.67	.....	.....	.....	3.2	6.130	11.034
	2			2	.....	38.43	51.88	.....	2.06	.....	.....	.....	.....	6.890	12.276
	3			3	.....	42.55	57.45	.....	2.06	.....	.....	.....	.....	7.552	13.594
1 mile west of, sec. 6, T. 8 S., R. 21 E.; South Side mine, No. 3 bed (face of room 2 off north entry 1, 50 feet in from entry, 7-foot 11-inch bed, 6-foot 11-inch cut).	223	*15127	A	1	10.30	34.31	44.03	11.36	2.19	.....	.....	.....	2.9	5.859	10.546
	2			2	.....	38.25	49.09	12.66	2.44	.....	.....	.....	.....	6.532	11.758
	3			3	.....	43.80	56.20	.....	2.79	.....	.....	.....	.....	7.479	13.462
Same (position, bed, and cut same as sample 15127).	223	*15133	A	1	10.22	33.98	44.12	11.68	2.09	.....	.....	.....	2.7	5.854	10.537
	2			2	.....	37.85	49.14	13.01	2.33	.....	.....	.....	.....	6.520	11.736
	3			3	.....	43.51	56.49	.....	2.68	.....	.....	.....	.....	7.485	13.491
Same (in crosscut from main entry to back entry, 336 feet from mouth of main entry and 75 feet from face of back entry, 7-foot 8-inch bed, 7-foot 4-inch cut).	223	*15128	A	1	9.99	34.65	44.45	10.91	2.53	.....	.....	.....	2.9	5.898	10.616
	2			2	.....	38.30	49.38	12.12	2.81	.....	.....	.....	.....	6.553	11.795
	3			3	.....	43.81	56.19	.....	3.20	.....	.....	.....	.....	7.457	13.423
Same (position, bed, and cut same as sample 15128).	223	*15132	A	1	10.10	34.65	43.96	11.29	2.41	.....	.....	.....	2.9	5.870	10.566
	2			2	.....	38.54	48.90	12.56	2.68	.....	.....	.....	.....	6.529	11.752
	3			3	.....	44.07	55.93	.....	3.06	.....	.....	.....	.....	7.467	13.441
Same (face of south back entry 1, 150 feet from main slope, 7-foot 2-inch bed, 6-foot 7-inch cut).	223	*15129	A	1	9.80	33.62	45.02	11.56	1.95	.....	.....	.....	3.2	5.910	10.638
	2			2	.....	37.27	49.91	12.82	2.16	.....	.....	.....	.....	6.552	11.794
	3			3	.....	42.75	57.25	.....	2.48	.....	.....	.....	.....	7.516	13.529
Same (position, bed, and cut same as sample 15129).	223	*15131	A	1	9.60	33.47	45.37	11.56	2.00	.....	.....	.....	3.1	5.900	10.620
	2			2	.....	37.02	50.19	12.79	2.21	.....	.....	.....	.....	6.527	11.749
	3			3	.....	42.45	57.55	.....	2.53	.....	.....	.....	.....	7.485	13.473
Same (composite of samples 15127, 15128, and 15129).	224	*15130	A	1	9.95	33.93	44.81	11.31	2.26	5.28	59.13	1.41	20.61	5.885	10.593
	2			2	.....	37.68	49.76	12.56	2.51	4.63	65.66	1.57	13.07	6.535	11.763
	3			3	.....	43.09	56.91	.....	2.87	5.29	75.09	1.80	14.95	7.473	13.451
Same (composite of samples 15131, 15132, and 15133).	224	*15134	A	1	9.87	34.00	44.61	11.52	2.25	5.32	59.79	1.47	19.65	5.882	10.588
	2			2	.....	37.72	49.50	12.78	2.50	4.68	66.34	1.63	12.07	6.596	11.74
	3			3	.....	43.25	56.75	.....	2.87	5.37	76.06	1.87	13.83	7.482	13.468

FLATHEAD COUNTY.																													
227	B	*12786	Flathead River, North Fork of; sec. 33, T. 34 N., R. 20 W., outcrop (surface exposure, 6-foot 9-inch bed, 3-foot 6-inch cut).	1	22.16	32.52	36.44	8.88	2.27	10.0	8.801																		
				2	41.78	46.81	11.41	2.92			6,282																		
				3	47.16	52.84	3.30	3.30			11,307																		
											7,691																		
MISSOULA COUNTY.																													
228	B	*13541	Missoula, 2 miles north of; sec. 4, T. 13 N., R. 19 W., Hell Gate mine (run of mine, from bunker at mouth of mine, represents coal from east entry, 6-foot bed).	1	24.70	29.33	26.11	19.86	.85	16.3	3,737																		
				2	38.95	44.08	26.37	1.13	3.74	51.85	4,963																		
				3	52.90	47.16	34.60	1.53	5.08	70.42	6,740																		
228	B	*13542	Same (in east entry off slope entry, 600 feet north and 300 feet east of mine mouth, 6-foot 10-inch bed).	1	25.21	29.19	26.01	19.59	.76	16.7	6,727																		
				2	39.03	34.78	26.19	1.02			8,933																		
				3	52.88	47.12	1.38	1.38			12,132																		
228	B	15114	Painted Rock, 1 mile northwest of; sec. 14, T. 5 N., R. 22 E.; Sholz mine (face of north main entry, 110 feet from mouth of entry, 2-foot 11-inch cut).	1	11.59	31.82	40.35	16.24	1.00	4.5	5,563																		
				2	35.99	45.64	18.37	1.13	1.13		10,013																		
				3	44.09	55.91	1.38	1.38			11,326																		
											7,708																		
228	B	*14755	Bighorn, 6½ miles east of; sec. 2, T. 4 N., R. 35 E., prospect (10 feet from outcrop, 3-foot 2½-inch bed).	1	19.79	30.67	35.19	14.35	1.50	8.5	4,766																		
				2	46.57	53.43	1.87	1.87			10,696																		
				3			2.28	2.28			7,237																		
TETON COUNTY.																													
229	B	12602	Browning, 22 miles northwest of; SE. ¼ NE. ¼ sec. 35, T. 36 N., R. 12 W., 1 M. Stone prospect (face of entry, 50 feet from mouth of entry).	1	8.00	35.37	44.18	12.45	1.00	2.3	6,137																		
				2	38.45	48.02	13.53	1.09	4.65	68.39	6,671																		
				3	44.47	55.53	1.26	1.26	5.38	79.09	12,008																		
229	B	12494	Cut Bank, 5 miles northwest of; NE. ¼ sec. 29, T. 34 N., R. 6 W., Allison prospect (in entry, 22-inch bed).	1	7.82	30.21	34.24	27.73	1.78	2.9	8,887																		
				2	32.77	37.15	30.08	1.93	4.837		8,707																		
				3	46.87	53.13	2.76	2.76	5.947		9,445																		
229	B	*14109	4 miles southwest of; NE. ¼ SW. ¼ sec. 26, T. 33 N., R. 6 W.; prospect (in fresh open cut, 11-inch cut).	1	16.57	29.21	36.25	17.97	.71	6.2	7,504																		
				2	35.01	43.45	21.54	3.08			13,507																		
				3	44.62	55.38																							
229	B	12427	Valley, 8 miles northwest of, on Birch Creek; SW. ¼ NW. ¼ sec. 32, T. 31 N., R. 5 W.; Blair mine (face of new entry 150 feet in, 2-foot 3-inch cut).	1	6.56	40.36	39.19	13.89	3.08	1.3	6,070																		
				2	43.19	41.94	14.87	1.21	3.30	16.03	6,496																		
				3	50.74	49.26	3.88	3.88	5.57	12.81	13,736																		
VALLEY COUNTY.																													
230	B	*14614	Antelope, 3 miles west of; sec. 21, T. 34 N., R. 55 E.; Richardson mine, "Richardson" bed (in new entry, 200 feet north of mouth of entry, 8-foot 3-inch cut).	1	29.14	29.65	33.82	7.39	.31	5.4	4,167																		
				2	41.84	47.73	10.43				5,880																		
				3	46.71	53.29	.49	.49			11,815																		
230	B	*10898	Bainville, 8 miles northeast of; sec. 10, T. 28 N., R. 59 E.; Red Bank mine, Red Bank bed (full section taken at face).	1	42.81	25.72	26.83	4.64	.24	35.3	3,392																		
				2	44.97	46.02	8.11		.42		10,675																		
				3	48.94	51.06	.46	.46	4.28	24.89	5,931																		
											6,455																		

Mondak, 7 miles northwest of, 1½ miles from the Great Northern Railway; sec. 18, T. 27 N., R. 59 E.; open pit.	234	*10900	B	1	41.63	27.11	27.18	4.08	.37	6.83	36.04	.77	51.91	33.3	3,185	5,733	
Plentywood, 2½ miles northeast of; sec. 10, T. 35 N., R. 55 E.; Pierce mine, "Richardson" bed (in mine, about 250 feet northwest of mine mouth, 8-foot bed, 6-foot 6-inch cut).	2	*14670	B	2	46.44	46.57	6.99	.63	.68	3.77	61.74	1.32	25.55	.....	5,457	9,822	
	3			3	49.03	50.07	.....	.....	.....	4.05	66.38	1.42	27.47	.....	6,867	10,562	
	3			3	34.29	29.56	28.06	8.09	.66	.....	.....	.....	.....	5.9	3,756	6,761	
.....	2	.....	.....	2	44.08	42.71	12.31	.....	1.00	.....	.....	.....	.....	.....	5,716	10,289	
	3			3	51.30	48.70	.....	.....	1.14	.....	.....	.....	.....	.....	6,519	11,734	
	NEVADA.																
ESMERALDA COUNTY.																	
Coaldale, 3½ miles southeast of; sec. 33, T. 2 N., R. 37 E.; Darms mine, C bed (in drift, off slope, 300 feet from mouth of slope and 20 feet from slope, 7-foot bed and cut).	234	13978	B	1	2.08	33.67	33.74	30.51	7.18	.....	.....	.....	.....	.6	5,329	9,792	
about 3½ miles southeast of; sec. 29, T. 2 N., R. 37 E.; Nevada mine, C bed (150 feet from mouth of entry, 9-foot bed and cut.)	2	.....	B	2	.....	27.26	27.94	44.80	.61	.....	.....	.....	.....	.....	5,442	9,706	
	3			3	.....	49.38	50.62	.....	1.11	.....	.....	.....	.....	7,905	14,229		
	3			3	1.65	31.31	35.48	31.56	7.54	.....	.....	.....	.....	.2	8,308	14,954	
Same (about 160 feet from mouth of entry, 8-foot bed and cut).	2	.....	B	2	.....	31.84	36.07	32.09	7.42	.....	.....	.....	.....	.....	5,421	9,758	
	3			3	.....	46.88	53.12	.....	11.10	.....	.....	.....	.....	7,982	11,368		
	3			3	1.61	39.18	43.70	15.42	6.64	.....	.....	.....	.....	.1	6,766	12,179	
Same (sample cut from block of best coal, 12-inch cut).	2	.....	B	2	.....	39.82	44.51	13.67	6.75	.....	.....	.....	.....	.....	6,877	12,379	
	3			3	.....	47.22	52.78	.....	8.00	.....	.....	.....	.....	.....	8,155	14,679	
NEW MEXICO.																	
BERNALILLO COUNTY.																	
Albuquerque, about 25 miles east of; sec. 6, T. 10 N., R. 6 E.; Holmes mine (at face in entry, 300 feet from entry mouth, 2-foot 3-inch cut).	235	12650	B	1	1.61	31.11	36.14	31.14	3.24	.....	.....	.....	.....	.5	5,581	10,046	
.....	2	.....	B	2	.....	31.62	36.73	31.65	3.29	.....	.....	.....	.....	.....	5,673	10,211	
	3			3	.....	46.26	53.74	.....	4.81	.....	.....	.....	.....	.....	8,300	14,940	
COLEMAN COUNTY.																	
Dawson; secs. 1, 2, 11, and 12, T. 29 N., and secs. 35 and 36, T. 28 N., R. 20 E.; Dawson No. 2 mine, Raton bed (face of north entry 5; 6,700 feet northeast of "high line" entrance).	236	12233	A	1	2.95	35.08	49.15	12.82	.92	.....	.....	.....	.....	1.4	.....	.....	
Same (face of east entry 13; 6,500 feet from "high line" entrance).	2	.....	A	2	.....	36.15	50.64	13.21	.95	.....	.....	.....	.....	.....	.....	.....	
	3			3	.....	41.65	58.35	.....	1.09	.....	.....	.....	.....	.....	.....	.....	
	3			3	3.75	36.47	48.12	11.66	.59							2.0	
Same (composite of samples 12233 and 12234) ...	2	.....	A	2	.....	37.89	50.00	12.11	.61	.....	.....	.....	.....	.....	.....	.....	
	3			3		43.11	56.89		.69								
	3			3	3.32	35.68	48.66	12.34	.71	5.31	70.35	1.19	10.10	1.7	7,087	12,757	
Gardner, ½ mile southeast of Blossburg; Gardner No. 1 mine Raton bed (face of room 6, west entry 1, off main entry, 400 feet from outcrop; 6-foot bed, 5-foot 5 inch cut).	2	.....	B	2	.....	36.90	50.34	12.76	.73	5.11	72.76	1.23	7.41	.....	7,330	13,194	
	3			3	.....	42.30	57.70	.....	.84	5.86	83.40	1.41	8.49	.....	8,402	15,124	
	3			3	2.34	36.70	45.73	15.23	.64	5.13	67.91	1.30	9.79	.9	6,809	12,256	
.....	2	.....	B	2	.....	37.58	46.82	15.60	.66	4.99	69.54	1.33	7.88	.....	6,972	12,570	
	3			3	.....	44.52	55.48	.....	.78	5.91	82.39	1.58	9.34	.....	8,260	14,868	

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.				Ultimate.					Calorific value.			
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- loss.	Calo- ries.	British thermal units.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
NEW MEXICO—Continued.																	
COLFAX COUNTY—continued.																	
Koehler; T. 29 N., R. 22 E.; Koehler No. 1 mine, Raton bed (face of room 20, off east entry 7; 4,300 feet southeast of mouth of main entry, 9-foot bed, 6-foot cut).	237	12335	A	1	4.96	36.32	48.98	9.74									
				2	.....	38.22	51.53	10.25	0.62								
				3	.....	42.58	57.42		.72								
Same (face of west entry 8; 4,300 feet southeast of mouth of main entry, 8-foot 2-inch bed, 6-foot 2-inch cut).	237	12336	A	1	3.08	36.60	48.35	11.97	.78								
				2	.....	37.76	49.89	12.35	.80								
				3	.....	43.08	56.02		.91								
Same (face of room 20, off east entry 7; 4,200 feet southeast of mouth of main entry).	237	12337	A	1	2.87	35.27	47.20	14.66	.48								
				2	.....	36.31	48.00	15.09	.49								
				3	.....	42.76	57.24		.58								
Same (composite of samples 12335, 12336, and 12337).	237	12338	A	1	3.64	36.10	48.26	12.00	.70	5.25	69.76	1.31	10.98	1.9	7,013	12,623	
				2		37.46	50.09	12.45	.73	5.03	72.40	1.36	8.03		7,278	13,100	
				3		42.79	57.21		.83	5.75	82.70	1.55	9.17		8,313	14,963	
Same (end of west entry 9; 4,900 feet southwest of mouth of main entry; 6-foot 3-inch bed).	237	14796	B	1	2.34	35.87	49.94	11.55	.63	5.17	71.27	1.34	9.74	1.0	7,178	12,920	
				2		36.73	51.14	12.13	.65	5.03	72.98	1.37	7.84		7,350	13,290	
				3		41.80	58.20		.74	5.72	83.05	1.56	8.93		8,364	15,055	
Sugarite, 7 miles northeast of Raton; NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 9, T. 31 N., R. 24 E.; Sugarite No. 1 mine; Sugarite bed (in entry 1,300 feet southwest of mine mouth, 5-foot 6½-inch bed, 5-foot 1-inch cut).	238	14791	B	1	3.83	38.12	49.12	8.93	.56	5.71	72.37	1.58	10.85	2.1	7,263	13,073	
				2		39.64	51.07	9.29	.58	5.49	75.25	1.64	7.75		7,552	13,594	
				3		43.70	56.30		.64	6.05	82.96	1.81	8.54		8,325	14,985	
7 miles northeast of Raton; NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 3, T. 31 N., R. 24 E.; Sugarite No. 2 mine; Sugarite bed (in entry 1,200 feet northeast of mine mouth, 5-foot 7-inch bed, 4-foot 9-inch cut).	238	14792	B	1	2.91	39.72	48.67	8.70	.51	5.62	73.52	1.57	10.08	1.0	7,380	13,284	
				2		40.91	50.13	8.96	.53	5.46	75.73	1.62	7.70		7,601	13,682	
				3		44.94	55.06		.58	6.00	83.18	1.78	8.46		8,349	15,028	
Yankee; Yankee No. 3 mine, Yankee bed (face of room 2, off west entry 10, 5-foot 9½-inch bed, 4-foot 7-inch cut.)	238	13365	A	1	5.21	36.99	48.25	9.55	.56								
				2		39.02	50.90	10.08	.59								
				3		43.39	56.61		.66								
Same (face of south entry 5, 6-foot 3½ inch bed, 4-foot 7-inch cut).	238	13366	A	1	6.05	35.23	42.10	16.62	.53								
				2		37.50	44.81	17.69	.56								
				3		45.56	54.44		.68								

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.					Ultimate.					Calorific value.	
		Laboratory No.	Kind.	Con- dition.	Mol- sure.	Volu- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
NORTH DAKOTA—Continued.																
MORTON COUNTY.																
Leith, 1½ miles west of; sec. 12, T. 133 N., R. 88 W.; Jones mine (in mine, about 75 feet southwest of the shaft, 5-foot 6-inch cut).	244	*14729	B	1 2 3	36.18	29.77 46.65 54.01	25.35 39.72 45.99	8.70 13.63	0.68 1.07 1.24	6.76 4.29 4.97	39.45 61.81 71.56	0.59 0.92 1.07	43.82 18.28 21.16	27.1	3,722 5,832 6,752	6,700 10,498 12,154
WARD COUNTY.																
Plaza, 25 miles west of; sec. 17, T. 152 N., R. 92 W.; prospect No. 3 bed (4-foot 11-inch bed, 3-foot 3-inch cut).	244	*11294	B	1 2 3	41.00	24.88 42.17 47.46	27.54 46.48 52.54	6.58 11.15	.44 .75 .84	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	33.7	3,266 5,536 6,231	5,879 9,935 11,216
WILLIAMS COUNTY.																
Avoca, ½ mile northeast of, 5 miles northeast of Williston; N.W. ¼ sec. 3, T. 154 N., R. 100 W.; Bruegger mine, C bed (50 feet west of end of main entry and 1,225 feet northwest of mine mouth, 11-foot bed, 5-foot 6-inch cut).	244	*12587	B	1 2 3	41.53	26.97 46.13 49.81	27.18 46.48 50.19	4.32 7.39	.30 .51 .55	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	33.2	3,578 6,119 6,607	6,440 11,014 11,893
Trenton, 6 miles northeast of; sec. 27, T. 154 N., R. 102 W.; Celtz mine (at end of main entry, about 150 feet from mine mouth, 5-foot 6-inch bed, 5-foot 1-inch cut).	245	*12411	B	1 2 3	42.71	25.70 44.80 50.92	24.77 43.24 49.08	6.82 11.90	1.38 2.41 2.74	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	34.7	3,368 5,879 6,673	6,062 10,582 12,011
Williston, ¾ miles southeast of; sec. 33, T. 154 N., R. 100 W.; Powell mine, C bed (50 feet north of main entry, about 900 feet northeast of mine mouth, 10-foot bed, 6-foot 6-inch cut).	245	*12588	B	1 2 3	42.91	26.81 46.96 51.76	24.98 43.76 48.24	5.30 9.28	.71 1.24 1.37	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	34.7	3,462 6,064 6,684	6,232 10,915 12,031
2 miles north and 1 mile east of; sec. 7, T. 154 N., R. 100 W.; B bed, A, S. Reclamation Service mine (William Steigler's room, 50 feet north of main entry and 1,225 feet east of portal, 10-foot 3-inch bed, 8-foot cut).	245	*12533	B	1 2 3	43.87	24.88 44.33 49.46	25.43 45.30 50.54	5.82 10.37	.49 .87 .97	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	33.2	3,299 5,877 6,557	5,938 10,579 11,803

249	B	15489	Two miles southwest of Smithfield; sec. 21, T. 8 N., R. 3 W.; Piney Fork No. 1 mine, Pittsburgh bed (room 14 off left entry of main east entry, 4,600 feet southwest of mine mouth, 4-foot 9 $\frac{1}{2}$ -inch bed, 4-foot 1 $\frac{1}{2}$ -inch cut).	1	4.87	36.63	51.25	7.25	2.60	5.36	71.91	1.38	11.50	2.8	7.218	12.992
				2	.....	38.51	53.87	7.62	2.73	5.07	73.59	1.45	7.54	.....	7.588	13.658
				3	.....	41.69	58.31	.....	2.96	5.49	81.83	1.57	8.15	.....	8.214	14.785
249	B	15490	Two miles southwest of Smithfield; sec. 17, T. 8 N., R. 3 W.; Piney Fork No. 2 mine, Pittsburgh bed (room 28, off east entry 21, 5,600 feet northeast of mine mouth, 4-foot 5 $\frac{1}{2}$ -inch bed, 3-foot 10 $\frac{1}{2}$ -inch cut).	1	5.47	35.77	53.28	5.46	.77	.....	.....	.....	.....	3.2	7.324	13.183
				2	.....	37.84	56.36	5.80	.81	.....	.....	.....	.....	.....	7.748	13.946
				3	.....	40.17	59.83	.....	.86	.....	.....	.....	.....	.....	8.225	14.805
250	B	15486	Smithfield, 2 miles east of; sec. 29, T. 5 N., R. 2 W.; Plumb Run No. 1 mine, Pittsburgh bed (room 7, east entry 7, south face entry, 2,500 feet northeast of mine mouth, 4-foot 9-inch bed, 4-foot 6-inch cut).	1	4.78	35.93	53.98	5.31	.98	5.35	74.13	1.46	12.77	2.6	7.417	13.351
				2	.....	37.73	56.69	5.58	1.03	5.06	77.85	1.53	8.95	.....	7.789	14.020
				3	.....	39.96	60.04	.....	1.09	5.36	82.45	1.62	9.48	.....	8.249	14.848
250	B	15487	Two miles east of; sec. 30, T. 5 N., R. 2 W.; Plumb Run No. 4 mine, Pittsburgh or No. 8 bed (room 14, off right entry 15, 4,400 feet northeast of mine mouth, 4-foot 4 $\frac{1}{2}$ -inch bed, 4-foot 1-inch cut.)	1	4.52	36.40	51.10	7.98	3.33	.....	.....	.....	.....	2.6	7.157	12.883
				2	.....	38.12	53.52	8.36	3.49	.....	.....	.....	.....	.....	7.496	13.493
				3	.....	41.60	58.40	.....	3.81	.....	.....	.....	.....	.....	8.180	14.724
250	B	15488	Two miles east of; sec. 29, T. 5 N., R. 2 W.; Plumb Run No. 5 mine, Pittsburgh or No. 8 bed (room 3, right entry 2, off first right face entry, 1,800 feet southeast of mine mouth, 4-foot 6 $\frac{1}{2}$ -inch bed, 4-foot 3 $\frac{1}{2}$ -inch cut).	1	4.26	36.61	52.18	6.95	2.57	.....	.....	.....	.....	2.3	7.307	13.153
				2	.....	38.24	54.50	7.26	2.68	.....	.....	.....	.....	.....	7.632	13.738
				3	.....	41.23	58.77	.....	2.89	.....	.....	.....	.....	.....	8.230	14.814
250	B	15676	Stenbenville, sec. 29, T. 2 N., R. 1 W.; La Belle mine, Lower Freeport bed (fifth south butt entry, off southeast entry, 4,400 feet southeast of shaft, 3-foot 4 $\frac{1}{2}$ -inch bed, 3-foot 1 $\frac{1}{2}$ -inch cut).	1	3.80	35.39	53.39	7.42	1.91	.....	.....	.....	.....	1.5	7.344	13.219
				2	.....	36.79	55.30	7.71	1.99	.....	.....	.....	.....	.....	7.634	13.741
				3	.....	39.56	60.14	.....	2.16	.....	.....	.....	.....	.....	8.271	14.888
250	B	15675	Same (in room 9, off left entry, off second south butt entry, 5,200 feet southeast from shaft, 3-foot 2-inch bed, 3-foot 3-inch cut).	1	3.82	35.90	53.43	6.85	1.90	5.24	74.20	1.45	10.36	1.6	7.418	13.352
				2	.....	37.33	55.55	7.12	1.98	5.01	77.15	1.51	7.23	.....	7.712	13.882
				3	.....	40.19	59.81	.....	2.13	5.39	83.07	1.63	7.78	.....	8.304	14.947
NOBLE COUNTY.																
251	A	17213	Belle Valley, 1 mile northwest of; Noble mine, No. 7 bed (face of south entry 8 (motor road) 5,700 feet southwest of shaft bottom, 4-foot 3 $\frac{1}{2}$ -inch bed, 4-foot 4-inch cut).	1	4.88	37.76	48.93	8.43	2.95	.....	.....	.....	.....	1.4	7.073	12.731
				2	.....	39.70	51.44	8.86	3.10	.....	.....	.....	.....	.....	7.436	13.385
				3	.....	43.56	56.44	.....	3.40	.....	.....	.....	.....	.....	8.159	14.686
251	A	17214	Same (face of room 5, off south entry 7, 5,600 feet southwest of shaft bottom, 5-foot 4-inch bed, 5-foot 2-inch cut).	1	5.13	37.17	49.59	8.11	2.99	.....	.....	.....	.....	1.5	7.053	12.695
				2	.....	39.18	52.27	8.55	3.15	.....	.....	.....	.....	.....	7.435	13.383
				3	.....	42.85	57.15	.....	3.44	.....	.....	.....	.....	.....	8.180	14.634
251	A	17215	Same (composite of samples 17213 and 17214).....	1	5.15	37.34	49.00	8.51	2.94	5.42	70.51	1.50	11.12	1.5	7.074	12.733
				2	.....	39.37	51.66	8.97	3.10	5.12	74.34	1.58	6.89	.....	7.459	13.426
				3	.....	43.25	56.75	.....	3.41	5.62	81.66	1.74	7.57	.....	8.194	14.749

Table of chemical analyses—(Continued.)

Locality, bed, etc.	Mine notes (page).	Sample.		Proximate.				Ultimate.					Calorific value.			
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
OKLAHOMA.																
HASKELL COUNTY.																
McCurtain, 1 mile west of; San Bois No. 2 mine; McCurtain (Hartshorne) bed (face of south entry 13; 5,000 feet west of slope mouth, 8-foot 3-inch bed, 5-foot 8½-inch cut).	252	13688	A	1	2.44	20.77	69.84	6.95	1.15					1.7		
				2		21.29	71.59	7.12	1.18							
				3		22.92	77.08		1.27							
Same (face of room 3 off north entry 13, top side; 5,000 feet west of slope mouth, 7-foot 3½-inch bed, 5-foot 7½-inch cut).	252	13689	A	1	2.57	20.29	71.21	5.93	.83					1.8		
				2		20.83	73.08	6.09	.85							
				3		22.18	77.82		.91							
Same (face of south entry 11, 50 feet from slope and 5,000 feet west of slope mouth, 6-foot 10-inch bed, 5-foot 6-inch cut).	252	13690	A	1	3.21	21.78	68.84	6.17	.59					2.2		
				2		22.50	71.13	6.37	.61							
				3		24.03	75.97		.65							
Same (face of south entry 12, top side; 5,500 feet west of slope mouth, 8-foot 11½-inch bed, 5-foot 8½-inch cut).	252	13691	A	1	2.81	20.79	70.65	5.75	.56					2.0		
				2		21.39	72.69	5.92	.58							
				3		22.74	77.26		.62							
Same (neck of room 6, off north entry 12, top side; 5,500 feet west of slope mouth, 6-foot 6-inch bed, 5-foot 4-inch cut).	252	13692	A	1	2.92	21.44	68.80	6.84	.76					2.0		
				2		22.09	70.86	7.05	.78							
				3		23.76	76.24		.84							
Same (composite of samples 13688, 13689, 13690, 13691, and 13692).	252	13693	A	1	2.70	21.07	69.88	6.35	.77	4.46	81.33	1.67	5.42	1.9	7.832	14,098
				2		21.65	71.82	6.53	.79	4.28	83.58	1.72	3.10		8,049	14,488
				3		23.16	76.84		.85	4.58	89.42	1.84	3.31		8,612	15,502
PITTSBURG COUNTY.																
Adamson, 1½ miles east of; sec. 9, T. 5 N., R. 17 E.; Eclipse No. 1 mine, Lower Hartshorne bed (face of east entry 3, 600 feet northeast of slope mouth, 4-foot 6-inch bed and cut).	252	16143	A	1	5.18	35.61	55.22	3.99	1.14					3.8		
				2		37.55	58.24	4.21	1.20							
				3		39.20	60.80		1.25							
Same (face of west entry 3; 600 feet northwest of slope mouth; 4-foot bed and cut).	253	16144	A	1	4.39	36.33	55.35	3.93	1.57					3.0		
				2		38.00	57.89	4.11	1.64							
				3		39.63	60.37		1.71							
Same (composite of samples 16143 and 16144).	253	16145	A	1	4.83	35.76	55.55	3.86	1.34	5.57	77.08	1.97	10.18	3.4	7,683	13,829
				2		37.58	58.36	4.06	1.41	5.29	81.00	2.07	6.17		8,073	14,531
				3		39.17	60.83		1.47	5.51	84.43	2.16	6.43		8,414	15,145

253	11945	A	1	2.81	36.37	56.35	4.47	75	1.1		
			2		37.42	57.98	4.60	77			
			3		39.22	60.78		81			
253	11916	A	1	3.17	35.28	57.39	4.16	58			
			2		36.43	59.37	4.30	60			
			3		38.07	61.93		63	1.3		
253	11917	A	1	3.25	34.55	57.39	4.61	59			
			2		35.71	59.53	4.76	61	1.3		
			3		37.90	62.50		64			
253	11918	A	1	2.97	35.78	56.82	4.43	64			
			2		36.87	58.56	4.57	66			
			3		38.64	61.36		69	1.2		
253	11919	A	1	3.07	35.26	57.30	4.37	62			
			2		36.38	59.11	4.51	64			
			3		38.10	61.90		67	1.2		
254	11592	A	1	3.19	32.71	57.06	7.04	50			
			2		33.79	58.94	7.27	52			
			3		36.44	63.56		56	1.7		
254	11594	A	1	3.57	33.38	58.05	5.00	49			
			2		34.62	60.19	5.19	51			
			3		36.51	63.49		54	2.0		
254	11670	A	1	3.22	34.84	57.21	4.73	48			
			2		36.00	59.11	4.89	50			
			3		37.85	62.15		53	1.3		
254	15188	A	1	2.84	35.71	55.93	5.52	61			
			2		38.75	57.57	5.68	63			
			3		38.96	61.04		67	1.2		
254	15189	A	1	3.21	33.65	56.30	4.64	67			
			2		36.83	58.38	4.79	69			
			3		38.68	61.32		72	1.5		
254	15104	A	1	3.31	36.23	55.69	5.17	82			
			2		37.55	57.69	5.36	85			
			3		39.08	60.32		90	1.7		
254	15105	A	1	3.57	36.06	55.15	5.22	86			
			2		37.39	57.20	5.41	89			
			3		39.53	60.47		94	1.7		
255	11569	A	1	3.28	33.79	57.75	5.18	64			
			2		34.94	59.70	5.36	66			
			3		36.92	63.08		69	1.9		
255	11586	A	1	3.99	31.01	59.51	5.49	56			
			2		32.30	61.98	5.72	58			
			3		34.26	65.74		62	2.4		
255	11597	A	1	3.56	32.64	57.93	5.57	55			
			2		34.16	60.06	5.78	57			
			3		36.25	63.75		60	2.1		

Alderson, 14 miles southwest of, sec. 15, T. 5 N., R. 15 E.; Alderson No. 5 mine, McAlester bed (face of room 1, off fourth west back entry, off west slope, 2,200 feet west of shaft, 3-foot 7-inch bed and cut).

Same (face of room 7 off west entry 7, off west slope, 2,800 feet northwest of shaft, 3-foot 5-inch bed and cut).

Same (face of room 66, off east entry 11, off east slope, 4,000 feet east of shaft, 3-foot 4-inch bed, 2-foot 6-inch cut).

Same (face of west entry 2, off east slope, about 2,000 feet southeast of shaft, 3-foot 7-inch bed and cut).

Same (composite of samples 11915, 11916, 11917, and 11918).

2 miles east of; T. 5 N., R. 15 E.; Alderson No. 38 mine, McAlester bed (room 1, off west entry 7, 2,200 feet down main slope, 2-foot 9-inch bed and cut).

Same (room 4, off east entry 5, 2,300 feet down main slope, 3-foot 3-inch bed and cut).

Same (room 26, off east entry 4, 1,900 feet down main slope, 3-foot 6-inch bed and cut).

Same (face of east entry 6, 3-foot 6-inch bed and cut).

Same (face of west air course 7, 3-foot 9-inch bed and cut).

Craig, Bolen-Darnall No. 4 mine, McAlester bed (face of eighth west entry, 3,000 feet northwest of mine mouth, 2-foot 11-inch bed, 2-foot 10-inch cut).

Same (face of eighth east entry, 3,000 feet from mine mouth, 3-foot 1-inch bed and cut).

McAlester, 2 miles east of, sec. 32, T. 6 N., R. 15 E.; Busby No. 5 mine, McAlester bed (room 11, off west entry 3, off east slope, 1,600 feet from shaft, 4-foot 2-inch bed and cut).

Same (face of west entry 2, off west slope, 300 feet beyond room 26, 4-foot bed and cut).

Same (face of east entry 3, off east slope, 120 feet beyond room 22, 4-foot 2-inch bed and cut).

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.		Proximate.				Ultimate.				Calorific value.						
		Laboratory No.	Kind.	Con- dition.	Mois- ture.	Vola- tile mat- ter.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- rific thermal units.				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
OKLAHOMA—Continued.																		
PITTSBURG COUNTY—continued.																		
McAlester, 2 miles east of, sec. 32, T. 6 N., R. 15 E., Busby No. 5 mine, McAlester bed (face of east entry 4, off west slope, 4-foot bed and cut).	255	11588	A	1	3.29	32.88	58.59	5.24	0.58					1.8				
				2		34.00	60.58	5.42										
	Same (face of east entry 5, off east slope, 4-foot 3-inch bed and cut).	255	11589	A	3	3.13	35.95	64.05	.63						1.8			
					2	33.57	32.52	59.69	4.66									.52
Same (face of east entry 3, off west slope, 200 feet beyond room 8, 4-foot bed and cut).	255	11590	A	1	3.17	32.31	59.41	5.11	.61					1.7				
Same (composite of samples 11586-11590).....	255	11591	A	2	3.58	32.11	59.04	5.27	.56	5.31	77.11	1.62	10.13	2.0	7,504	13,615		
				1	33.31	61.22	5.47	.58	5.09	79.97	1.68	7.21	7.845	14,121				
				3	35.24	64.76	.61	5.38	84.60	1.78	7.63	8,299	14,938					
OREGON.																		
COOS COUNTY.																		
West Fork, 36 miles southwest of, NE. $\frac{1}{4}$ sec. 28, T. 32 S., R. 11 W.; Flanagan prospect, Anderson bed (in entry, 125 feet from mouth, 5-foot 6-inch bed, 5-foot 1 $\frac{1}{2}$ -inch cut).	255	14828	B	1	10.13	31.31	24.91	33.65	1.11					6.2	4,148	7,466		
				2		34.84	27.72	37.44									4.615	8,307
				3	55.69	44.31	1.98	7,377									13,279	
37 miles southwest of, SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 29, T. 32 S., R. 11 W.; Hammond prospect, Carter bed (in entry, 100 feet from mouth, 6-foot bed, 4-foot 5-inch cut).	256	14831	B	1	8.05	34.98	37.12	19.85	.58					3.7	5,460	9,828		
				2		38.04	40.37	21.59	.63								5,938	10,688
				3		48.52	51.48	.80	7,573								13,631	
36 miles southwest of, SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 32, T. 32 S., R. 11 W.; Hillis prospect, Anderson bed (in entry 90 feet from mouth, 6-foot 10-inch bed, 1-foot 3 $\frac{1}{2}$ -inch cut).	256	14827	B	1	9.97	38.45	36.35	15.23	.63					6.7	5,849	10,528		
				2		42.71	40.37	16.92	.70								6,496	11,693
				3		51.41	48.59	.84	7,819								14,074	
Same (in entry 90 feet from mouth, 6-foot 10-inch bed, 24-foot 9 $\frac{1}{2}$ -inch cut).	256	14830	B	1	6.71	35.51	27.41	30.37	2.22					3.3	4,750	8,550		
				2		38.06	29.39	32.55	2.38								5,092	9,166
				3		56.43	43.57	3.35	7,549								13,588	

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.		Proximate.						Ultimate.				Calorific value.		
		Laboratory No.	Kind.	Con- dition.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PENNSYLVANIA—Continued.																
ALLEGHENY COUNTY—continued.																
Creighton, Hite mine, Upper Freeport (E) and Lower Freeport (D) beds (face of room 17, butt entry 1, 8,000 feet west of mine mouth, 5-foot 10-inch bed, 4-foot 11-inch cut).	260	11130	A	1 2 3	2.69	34.80 35.76 38.33	55.99 57.54 61.67	6.52 6.70	0.96 1.06	.....	.....	.....	.....	1.2	.....	.....
Same (face of room 18, butt entry 3, 9,000 feet from mine mouth, 5-foot 11-inch bed, 5-foot 3-inch cut).	260	11132	A	1 2 3	2.66	34.35 35.29 37.84	56.42 57.06 62.16	6.57 6.75	 1.02 1.09	.....	.....	.....	.....	1.2	.....	.....
Same (grab sample of cannel (roof) coal, at inter- section of line entry and main entry 1, 1-foot 3-inch cut).	260	11133	A	1 2 3	1.12	26.17 26.47 41.80	36.45 36.86 58.20	36.26 36.67	1.58 1.59 2.53	.....	.....	.....	.....	0.4	.....	.....
Oak Station, short distance south of Pittsburgh; Oak mine, Pittsburgh bed (room 10, left entry 13, 5,300 feet north of mine mouth).	260	10845	A	1 2 3	3.48	35.15 36.42 38.80	55.45 57.45 61.20	5.92 6.13	1.18 1.22 1.30	5.42 5.21 5.55	75.73 78.46 83.58	1.45 1.50 1.60	10.30 7.48 7.37	1.7	7,611 7,885 8,400	13,700 14,193 15,120
BEDFORD COUNTY.																
Hopewell, 2 miles east of Cambria No. 3 mine, Upper Freeport (locally known as Kelley) bed (face of heading 2, 7,300 feet northeast of shaft, 3-foot 11½-inch bed and cut).	261	15057	A	1 2 3	..... ..... .....	17.08 19.50	70.50 80.50	12.42	2.26 2.58 .....	.....	.....	.....	.....	.....	7,594 8,671	13,669 15,608
Same (face of room 7, off heading 2, 7,000 feet northeast of shaft; 3-foot 10½-inch bed, 3-foot 9½-inch cut).	261	15055	A	1 2 3	1.55	15.86 16.11 18.73	68.84 69.92 81.27	13.75 13.97 2.41	2.04 2.07 2.41	0.04 ..... .....	.....	.....	.....	1.2	7,299 7,414 8,618	13,138 13,345 15,512
Same (600 feet to the right from top of plane 3; 5,100 feet northeast of shaft; 4-foot 8½-inch bed, 4-foot 3½-inch cut).	261	15056	A	1 2 3	1.25	16.58 16.79 18.79	71.07 72.58 81.21	10.63 10.63	1.00 1.01 1.13	.....	.....	.....	.....	1.0	7,646 7,743 8,064	13,783 13,937 15,505
Same (face of heading 3; 7,400 feet northeast of shaft; 3-foot 11½-inch bed and cut).	261	15058	A	1 2 3	1.74	15.88 16.16 18.58	69.60 70.83 81.42	12.78 13.01	2.42 2.46 2.83	.....	.....	.....	.....	1.4	7,353 7,483 8,605	13,299 13,473 15,489

Same (face of room, 200 feet from face of heading 4, 7-foot northeast of shaft, 3-foot 7½-inch bed and cut).	261	15059	A	1	1.61	16.78	69.70	11.91	2.20	7.496	13,493
Same (composite of samples 15055, 15056, 15058, and 15059).	261	15060	A	2	1.58	17.06	70.83	12.11	2.55	7,619	13,714
				3	1.58	16.32	69.98	12.12	2.55	8,669	15,004
				2	1.58	16.32	71.10	12.32	1.97	7,449	13,408
				3	1.58	18.91	81.09	12.32	2.25	7,569	13,624
				3	1.58	18.91	81.09	12.32	2.25	8,632	15,538
CAMDRIA COUNTY.											
Barnesboro, 1 mile east of; Allport mine, Lower Freeport or D bed (face of left entry 2, off heading 9, off main heading, 6,250 feet southeast of mine mouth, 4-foot 4½-inch bed, 4-foot 1½-inch cut).	262	W19740	A	1	3.5	20.9	68.2	7.4	1.80	7,739	13,930
Same (face of left entry 2, off heading 9, off main heading, 6,250 feet southeast of mine mouth, 4-foot 4½-inch bed, 4-foot 1½-inch cut).	262	W19741	A	2	21.7	20.3	70.9	7.8	1.80	8,017	14,430
Same (face of right entry 9, off main heading, 6,950 feet southwest of mine mouth, 4-foot 8-inch bed, 4-foot 6½-inch cut).	262	W19742	A	3	23.5	21.7	70.6	7.7	1.85	8,017	14,430
Same (composite of samples W19740, W19741, and W19742).	262	12221	A	3	23.5	21.7	70.6	7.7	2.00	8,683	15,630
1 mile east of; Allport mine. Upper Freeport or E bed (face of right entry 3, off main heading, 3,700 feet southeast of mine mouth, 3-foot 8½-inch bed, 3-foot 6-inch cut).	262	W19738	A	1	2.9	20.7	68.8	7.6	1.75	7,806	14,050
Same (face of main slant, off main entry, 3,700 feet southeast of mine mouth, 3-foot 7½-inch bed, 3-foot 5-inch cut).	262	W19739	A	2	21.3	20.3	70.9	7.8	1.80	8,039	14,470
Same (600 feet in on second panel from main slant, off main entry, 2,800 feet south of mine mouth, 3-foot 7½-inch bed and cut).	262	W19743	A	3	23.1	21.3	70.9	7.8	1.95	8,792	15,709
Same (composite of samples W19738, W19739, and W19743).	262	12231	A	3	23.1	21.3	70.9	7.8	1.40	7,933	14,280
1½ miles east of; Cymbria mine, Miller, B, or Lower Kittanning bed (face of right entry 2, about 1,000 feet southwest of shaft, 2-foot 10½-inch bed, 2-foot 9½-inch cut).	263	W20394	A	1	1.45	23.40	67.92	7.23	1.81	7,904	14,227
Same (face of room 18, off left entry 2, 1,200 feet northeast of shaft, 2-foot 7½-inch bed and cut).	263	W20395	A	2	23.7	23.7	67.4	7.5	1.80	8,072	14,530
Same (face of main heading, 1,900 feet from shaft, 2-foot 4½-inch bed, 2-foot 4½-inch cut).	263	W20444	A	3	25.2	23.3	69.0	7.7	1.80	8,744	15,740
Same (face of left entry 3, 1,400 feet northeast of shaft, 2-foot 5-inch bed and cut).	263	W20445	A	1	2.5	23.2	68.4	5.9	1.85	7,989	14,380
Same (face of right entry 3, 1,200 feet southeast of shaft, 2-foot 11-inch bed and cut).	263	W20446	A	2	23.8	23.8	70.1	6.1	1.70	8,189	14,740
Same (composite of samples W20394, W20395, W20444, W20445, and W20446).	263	12372	A	3	25.3	25.3	74.7	7.5	1.75	8,717	15,690
				1	1.45	23.40	67.92	7.23	1.83	7,934	14,281
				2	23.74	23.74	68.92	7.34	1.37	8,051	14,492
				3	25.62	25.62	74.38	7.33	1.37	8,689	15,640
				1	2.2	20.4	71.5	5.9	1.48	8,022	14,440
				2	20.9	20.9	73.1	6.0	1.48	8,206	14,770
				3	22.2	22.2	77.8	6.0	1.90	8,728	15,710
				1	2.1	21.7	70.8	5.4	1.85	8,094	14,570
				2	22.2	22.2	72.3	5.5	1.85	8,272	14,890
				3	23.5	23.5	76.5	5.9	1.90	8,755	15,760
				1	2.3	21.9	67.4	8.9	3.00	7,728	13,910
				2	21.9	21.9	69.0	9.1	3.10	7,911	14,240
				3	24.1	24.1	75.9	8.5	3.41	8,706	15,670
				1	3.1	21.3	67.1	8.5	3.15	7,694	13,850
				2	22.0	22.0	69.2	8.8	3.30	7,939	14,290
				3	24.1	24.1	75.9	8.5	3.62	8,700	15,660
				1	3.4	22.1	68.3	6.2	1.20	7,944	14,300
				2	22.9	22.9	70.7	6.4	1.25	8,228	14,810
				3	24.5	24.5	75.5	6.4	1.34	8,794	15,830
				1	2	22.86	69.15	7.17	2.02	8,024	14,443
				2	23.05	23.05	69.72	7.23	2.04	8,091	14,564
				3	24.85	24.85	75.15	7.23	2.20	8,721	15,698

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.		Proximate.					Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Con-dition.	Mois-ture.	Vola-tile mat-ter.	Fixed car-bon.	ash.	Sul-phur.	Hy-dro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.	Air-dry-ing loss.	Calo-ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PENNSYLVANIA—Continued.																
CAMBRIA COUNTY—continued.																
Barnesboro, 2 miles east of; Cymbria No. 1 mine, Lower Freeport or D bed (face of first crosscut, off left entry 2, 550 feet from mine mouth, 4-foot 5-inch bed, 4-foot 1-inch cut).	264	12162	A	1	3.42	22.74	66.91	6.93	1.77					2.8	7,801	14,042
				2		23.54	69.28	7.18	1.83						8,077	14,539
				3		25.36	74.64		1.97						8,702	15,664
Same (face of eighth right, off left entry 2, 4,000 feet from mine mouth, 3-foot 11½-inch bed, 3-foot 6½-inch cut).	264	12163	A	1	2.57	23.10	67.49	6.84	1.22					2.0	7,891	14,204
				2		23.71	69.27	7.02	1.25						8,099	14,578
				3		25.50	74.50		1.34						8,710	15,678
Same (face of first left, off left entry 2, 4,000 feet from mine mouth, 4-foot 7½-inch bed, 4-foot 3½-inch cut).	264	12164	A	1	2.95	23.41	67.74	5.90	1.34					2.4	7,940	14,292
				2		24.12	69.80	6.08	1.38						8,181	14,726
				3		25.68	74.32		1.47						8,710	15,678
Same (face of third right, off main entry 2, 3,200 feet northeast of mine mouth, 4-foot 1½-inch bed, 3-foot 10½-inch cut).	264	12170	A	1	2.76	22.69	68.08	6.47	1.57					2.2	7,882	14,188
				2		23.33	70.02	6.65	1.61						8,106	14,591
				3		24.99	75.01		1.72						8,683	15,629
Same (face of second left, off main heading, 2,900 feet northeast of mine mouth, 4-foot 3½-inch bed, 4-foot 3-inch cut).	264	12171	A	1	2.98	23.46	67.84	5.72	1.41					2.4	7,963	14,333
				2		24.18	69.92	5.90	1.45						8,207	14,773
				3		25.70	74.30		1.54						8,722	15,700
Same (composite of samples 12162, 12163, 12164, 12170, and 12171).	264	12165	A	1	3.08	22.50	67.93	6.40	1.59	5.01	80.39	1.26	5.26	2.4	7,875	14,175
				2		23.22	70.08	6.70	1.64	4.82	82.95	1.30	2.59		8,135	14,625
				3		24.89	75.11		1.76	5.17	88.91	1.39	2.77		8,708	15,674
2 miles east of; Cymbria No. 2½ mine, Upper Freeport or E bed (face of left entry 2, 2,000 feet from mine mouth, 3-foot 7½-inch bed, 3-foot 4½-inch cut).	265	12158	A	1	2.76	24.03	63.89	9.32	1.32					2.2	7,647	13,765
				2		24.71	65.71	9.58	1.36						7,864	14,155
				3		27.33	72.67		1.43						8,697	15,655
Same (face of room 12, off main heading, 2,200 feet from mine mouth, 3-foot 7½-inch bed, 3-foot 5-inch cut).	265	12159	A	1	3.24	23.16	65.86	7.74	1.38					2.6	7,773	13,991
				2		23.94	68.06	8.00	1.43						8,033	14,450
				3		26.02	73.98		1.55						8,732	15,718
Same (face of third left main heading, 3-foot 7½-inch bed, 3-foot 4½-inch cut).	265	12160	A	1	3.88	22.74	65.76	7.62	1.37					3.2	7,720	13,896
				2		23.66	68.41	7.93	1.43						8,032	14,458
				3		25.70	74.30		1.55						8,724	15,703

265	12172	A	1	2.88	23.22	55.74	8.16	1.67	.....	.....	.....	2.3	7,745 14,355
			2	.....	23.91	67.69	8.40	1.72	.....	.....	.....	.....	7,975 14,355
265	12173	A	3	2.97	26.10	73.90	8.62	1.98	.....	.....	.....	2.4	7,706 13,838
			2	.....	22.98	65.43	8.88	2.04	.....	.....	.....	.....	7,923 15,651
265	12161	A	3	.....	23.68	67.44	.....	.....	.....	.....	.....	.....	7,923 15,651
			2	.....	25.99	74.01	.....	.....	.....	.....	.....	.....	7,923 15,651
			1	2.98	22.85	65.78	8.39	1.63	5.02	77.87	5.77	2.5	7,726 13,907
			2	.....	23.55	67.80	8.65	1.68	4.84	80.26	1.36	3.21	7,963 14,333
			3	.....	25.78	74.22	.....	.....	5.30	87.86	1.49	3.51	7,917 15,691
265	W19643	A	1	2.6	23.3	66.9	7.2	1.25	.....	.....	.....	.....	7,817 14,070
			2	.....	23.9	68.7	7.4	1.30	.....	.....	.....	.....	8,022 14,440
			3	.....	23.8	74.2	.....	1.40	.....	.....	.....	.....	8,067 15,600
265	W19644	A	1	1.9	23.8	67.6	6.7	1.05	.....	.....	.....	.....	7,956 14,320
			2	.....	24.3	68.9	6.8	1.10	.....	.....	.....	.....	8,111 14,600
			3	.....	26.1	73.9	.....	1.18	.....	.....	.....	.....	7,700 15,660
265	W19645	A	1	2.3	23.1	67.5	7.1	1.15	.....	.....	.....	.....	7,828 14,080
			2	.....	23.7	69.0	7.3	1.20	.....	.....	.....	.....	8,017 14,430
			3	.....	25.6	74.4	.....	1.29	.....	.....	.....	.....	8,050 15,570
265	W19646	A	1	3.3	24.5	65.0	7.2	1.85	.....	.....	.....	.....	7,778 14,000
			2	.....	25.3	67.3	7.4	1.90	.....	.....	.....	.....	8,044 15,640
			3	.....	27.3	72.7	.....	2.05	.....	.....	.....	.....	7,889 15,640
265	W19647	A	1	2.1	22.7	66.5	8.7	1.80	.....	.....	.....	.....	7,728 13,910
			2	.....	22.7	67.9	8.9	1.85	.....	.....	.....	.....	7,894 14,210
			3	.....	25.5	74.5	.....	2.03	.....	.....	.....	.....	7,667 15,000
265	W19648	A	1	2.4	23.5	67.2	6.9	1.50	.....	.....	.....	.....	7,883 14,190
			2	.....	24.1	68.8	7.1	1.55	.....	.....	.....	.....	8,078 14,540
			3	.....	25.9	74.1	.....	1.67	.....	.....	.....	.....	8,094 15,650
265	12212	A	1	1.54	23.86	67.08	7.52	1.53	4.73	80.47	1.38	4.37	7,886 14,195
			2	.....	24.3	68.13	7.64	1.55	4.63	81.73	1.40	3.05	8,009 14,416
			3	.....	26.23	73.77	.....	1.68	5.01	88.49	1.52	3.80	8,671 15,083
266	12174	A	1	3.25	15.85	73.42	7.48	2.10	.....	.....	.....	2.8	7,807 14,524
			2	.....	16.38	73.89	7.73	2.17	.....	.....	.....	.....	8,069 14,524
			3	.....	17.75	82.25	.....	2.35	.....	.....	.....	.....	8,745 15,741
266	12175	A	1	2.72	16.70	75.38	5.20	.55	.....	.....	.....	2.2	8,067 14,521
			2	.....	17.17	77.48	5.35	.57	.....	.....	.....	.....	8,293 14,927
			3	.....	18.14	81.86	.....	.60	.....	.....	.....	.....	7,622 13,772
266	12176	A	1	3.90	15.69	73.03	7.98	2.28	.....	.....	.....	3.3	7,720 13,896
			2	.....	15.70	76.00	8.30	2.37	.....	.....	.....	.....	8,033 14,459
			3	.....	17.12	82.88	.....	2.58	.....	.....	.....	.....	7,700 15,768
266	12177	A	1	3.53	15.68	73.95	6.84	1.94	.....	.....	.....	3.0	7,847 14,125
			2	.....	16.25	76.06	7.09	2.01	.....	.....	.....	.....	8,134 14,641
			3	.....	17.49	82.51	.....	2.16	.....	.....	.....	.....	7,755 15,759
266	12178	A	1	3.44	16.18	73.46	6.92	1.83	4.64	80.61	1.20	4.89	7,841 14,114
			2	.....	16.76	76.07	7.17	1.90	4.41	83.48	1.24	1.80	8,120 14,616
			3	.....	18.05	81.95	.....	2.05	4.75	89.92	1.34	1.94	8,747 15,745
266	12179	A	1	2.89	14.08	74.83	7.00	2.36	4.59	80.18	1.25	2.4	7,817 14,071
			2	.....	15.12	77.05	7.83	2.43	4.40	82.57	1.29	1.48	8,050 14,490
			3	.....	16.41	83.59	.....	2.64	4.77	89.59	1.40	.....	8,734 15,721

Beaverdale; Pennsylvania No. 15 mine, Kittanning or B bed (face of first slant, off right heading 3, off first dip, off main entry, 3-foot 3-inch bed and cut).

Same (face of sump for main dip, off left heading 4, off first dip, off main entry, 3-foot 4-inch bed and cut).

Same (face of first slant, off right heading 4, off first dip off main entry, 3-foot 4-inch bed and cut).

Same (face of first slant, off right heading 3, off first dip off main entry, 3-foot 1-inch bed and cut).

Same (composite of samples 12174, 12175, 12176, and 12177).

Same (pillar, room 23, off right heading 3, off first dip, off main entry).

Table of chemical analyses—Continued.

Locality, bed, etc	Mine notes (page).	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Con-dition.	Mois-ture.	Vola-tile mat-ter.	Fixed car-bon.	Ash.	Sul-phur.	Hy-dro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.	Air-dry-ing loss.	Calo-ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PENNSYLVANIA—Continued.																
CAMBRIA COUNTY continued.																
Bens Creek, 1 mile east of; Bens Creek No. 1 mine, Miller, B, or Lower Kittanning bed (barrier pillar on No. 2 side track, 100 feet from room 21 and 3,200 feet southwest of old main heading, 3-foot 63-inch bed and cut).	267	W19697	A	1 2 3	2.1	17.0 17.4 18.6	74.7 76.3 81.4	6.2 6.3	1.10 1.15 1.23	.....	.....	.....	.....	.....	8,017 8,189 8,739	14,430 14,740 15,730
Same (pillar on No. 1 side track, between manway and room 1, 1,200 feet southwest of shaft, 3-foot 14-inch bed and cut).	267	W19700	A	1 2 3	3.4	16.3 16.9 17.9	74.7 77.3 82.1	5.6 5.8 5.9	.55 .60 .64	.....	.....	.....	.....	.....	7,956 8,233 8,739	14,320 14,820 15,730
Same (main pillar of old main heading, 900 feet southwest of shaft, 3-foot 9-inch bed and cut).	267	W19702	A	1 2 3	3.7	17.7 18.3 19.5	72.7 75.6 80.5	5.9 6.1 5.7	.65 .70 1.05	.....	.....	.....	.....	.....	8,033 8,233 8,772	14,290 14,820 15,790
Same (pillar of heading 1, between rooms 27 and 28, 2,700 feet southwest of shaft, 3-foot 73-inch bed and cut).	267	W19737	A	1 2 3	3.3	16.3 16.9 18.0	74.7 77.2 82.0	5.7 5.9 5.9	1.05 1.10 1.17	.....	.....	.....	.....	.....	8,000 8,272 8,789	14,400 14,890 15,820
Same (composite of samples W19697, W19700, W19702, and W19737).	267	12211	A	1 2 3	1.83	16.82 17.13 18.25	75.34 76.75 81.75	6.01 6.12	.84 .92	4.56 4.44 4.73	83.43 84.98 90.52	1.28 1.30 1.38	3.88 2.30 2.45	.....	8,080 8,230 8,767	14,544 14,814 15,781
Same (face of heading 6, off first dip, 700 feet south-east of shaft, 3-foot 4-inch bed and cut).	267	W19736	A	1 2 3	2.6	16.6 17.0 18.1	74.8 76.8 81.9	6.0 6.2 6.0	.75 .80 .85	.....	.....	.....	.....	.....	8,028 8,239 8,783	14,450 14,830 15,810
1 mile south of; Pennsylvania No. 2 mine, Miller, B, or Lower Kittanning bed (face of heading 19, 4,100 feet northeast of drift mouth, 3-foot 93-inch bed, 3-foot 73-inch cut).	268	W19695	A	1 2 3	2.8	16.2 16.7 18.0	74.0 76.1 82.0	7.0 7.2	1.50 1.55 1.67	.....	.....	.....	.....	.....	8,901 8,189 8,822	14,330 14,740 15,880
Same (pillar between rooms 14 and 15, fourth main heading, 2,900 feet northwest of drift mouth, 3-foot 38-inch bed, 3-foot 33-inch cut).	268	W19696	A	1 2 3	2.4	16.6 17.0 18.3	74.3 76.1 81.7	6.7 6.9 6.9	1.10 1.15 1.24	.....	.....	.....	.....	.....	7,978 8,178 8,783	14,360 14,720 15,840
Same (pillar between rooms 2 and 3, off butt entry 17, 3,900 feet north of drift mouth, 3-foot 73-inch bed and cut).	268	W19698	A	1 2 3	2.8	16.4 16.9 17.8	73.6 77.8 82.2	5.2 5.3	.90 .95 1.00	.....	.....	.....	.....	.....	8,083 8,317 8,783	14,550 14,970 15,840

Table of chemical analyses—Continued.

Mine notes (page).	Locality, bed, etc.	Sample.			Proximate.					Ultimate.					Calorific value.	
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
2	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PENNSYLVANIA—Continued.																
CAMBRIA COUNTY—continued.																
269	Colver mine, B bed (position, bed, and cut same as sample 13639).	13641	A	1	a 1.03	20.93	71.91	5.23	1.02							
				2	2	21.34	73.33	5.33	1.04							
				3	3	22.54	72.46		1.10							
269	Same (position, bed, and cut same as sample 13638).	13642	A	1	a 3.27	20.04	71.50	5.19	1.05							
				2	2	20.72	73.91	5.37	1.09							
				3	3	21.80	78.11		1.15							
269	Same (position, bed, and cut same as sample 13637).	13643	A	1	a 4.06	19.73	70.91	4.70	.88							
				2	2	20.69	74.38	4.93	.92							
				3	3	21.76	78.24		.97							
270	Dunlo, one mile south of: Henriette mine, Miller or B bed (rib of room 2, off right heading 1, off slope 2, 700 feet north of shaft No. 2, 3-foot 9½-inch bed, 3-foot 5½-inch cut).	14238	A	1	2.34	18.70	74.24	4.72	.60							
				2	2	19.15	76.02	4.83	.61							
				3	3	20.12	73.88		.64							
270	Same (junction of sixth slant and main heading, on curve, 3,050 feet north of shaft No. 2, 3-foot 10-inch bed, 3-foot 7-inch cut).	14239	A	1	2.56	18.57	73.86	5.01	.75							
				2	2	19.06	75.80	5.14	.77							
				3	3	20.09	79.91		.81							
270	Same (rib of pillar of left entry 6, near room 13, north of rock fault, 4,350 feet northwest of shaft No. 2, 3-foot 6½-inch bed, 3-foot 4½-inch cut).	14240	A	1	3.01	17.45	74.94	4.60	.60							
				2	2	17.99	77.27	4.74								
				3	3	18.89	81.11		.65							
270	Same (pillar of left heading 6, 450 feet north of back heading off slope 2, 4,150 feet northwest of shaft No. 2, 3-foot 7½-inch bed, 3-foot 4-inch cut).	14241	A	1	2.77	17.41	75.19	4.63	.68							
				2	2	17.91	77.33	4.76								
				3	3	18.81	81.19		.74							
270	Same (rib between rooms 1 and 2, first level above main entry about 1,500 feet northwest of shaft No. 2, 3-foot 8-inch cut).	14242	A	1	2.82	18.42	74.25	4.51	.59							
				2	2	18.95	76.41	4.64	.61							
				3	3	19.87	80.13		.64							
271	Same (composite of samples 14238-14242).....	14243	A	1	2.65	18.08	74.64	4.63	.62							
				2	2	18.57	76.67	4.76	.64							
				3	3	19.00	80.50		.67							
270	Same (position and bed same as sample 14240, 2 inches of top coal or bone).	14244	A	1	2.84	17.05	75.19	4.91	.53							
				2	2	17.53	77.39	5.05	.55							
				3	3	18.49	81.51		.58							

Same (position and bed same as sample 14238, 4 inches of top coal or bone).	270	14245	A	1	2.39	19.11	74.89	3.61	.55	.....	1.5	.....
Same (position and bed same as sample 14239, 3 inches of top coal or bone).	270	14246	A	2	.....	19.58	76.72	3.70	.56	.....	.....	.....
	270	14246	A	3	.....	20.33	79.67	.....	.58	.....	.....	.....
	271	12134	A	1	1.80	18.60	69.71	9.89	2.07	.....	.8	.....
	271	12134	A	2	.....	18.94	70.99	10.07	2.11	.....	.....	.....
	271	12134	A	3	.....	21.06	78.94	.....	2.35	.....	.....	.....
El Mora, near: Peerless No. 1 mine, Lower Kittanning or B bed (heading stump on left entry 3, off main entry, about 1,700 feet northeast of drift mouth, 3-foot 3½-inch bed and cut).	271	12134	A	1	3.18	20.91	69.73	6.18	1.97	.....	2.6	7.939
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	271	12135	A	2	.....	20.91	69.73	6.18	1.97	.....	.....	14.290
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	271	12135	A	3	.....	21.60	72.02	6.38	2.03	.....	.....	14.758
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	271	12135	A	3	.....	23.07	76.93	.....	2.17	.....	.....	8.757
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	271	12135	A	1	3.55	21.42	68.06	6.97	1.31	.....	2.9	7.840
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	271	12135	A	2	.....	22.21	70.56	7.23	1.36	.....	.....	8.129
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	271	12135	A	3	.....	23.94	76.06	.....	1.47	.....	.....	14.632
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	271	12136	A	1	3.28	21.07	69.19	6.46	1.43	.....	2.5	8.762
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	271	12136	A	2	.....	21.78	71.54	6.68	1.48	.....	.....	15.772
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	271	12136	A	3	.....	23.34	76.66	.....	1.59	.....	.....	7.953
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	271	12137	A	1	3.59	20.43	68.79	7.19	1.95	.....	2.7	8.223
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	271	12137	A	2	.....	21.19	71.35	7.46	2.02	.....	.....	15.862
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	271	12137	A	3	.....	22.90	77.10	.....	2.18	.....	.....	14.175
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	271	12138	A	1	3.92	20.85	69.19	6.04	.90	.....	3.3	8.168
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	271	12138	A	2	.....	21.70	72.01	6.29	.94	.....	.....	14.702
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	271	12138	A	3	.....	23.16	76.84	.....	1.00	.....	.....	8.826
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	12139	A	1	3.47	20.73	69.39	6.41	1.55	.....	.....	7.809
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	12139	A	2	.....	21.47	71.89	6.64	1.61	.....	2.8	8.128
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	12139	A	3	.....	23.00	77.00	.....	1.72	.....	.....	14.683
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	W20433	A	1	2.2	24.6	64.2	9.0	1.15	.....	.....	8.157
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	W20433	A	2	.....	25.1	65.7	9.2	1.20	.....	.....	15.727
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	W20433	A	3	.....	27.6	72.4	.....	1.32	.....	.....	7.694
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	W20434	A	1	2.4	23.2	64.5	9.9	1.35	.....	.....	13.850
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	W20434	A	2	.....	23.8	66.1	10.1	1.40	.....	.....	7.867
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	W20434	A	3	.....	26.5	73.5	.....	1.56	.....	.....	14.160
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	W20474	A	1	2.6	24.1	66.6	6.7	1.00	.....	.....	13.710
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	W20474	A	2	.....	24.8	68.3	6.9	1.05	.....	.....	14.040
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	W20474	A	3	.....	26.6	73.4	.....	1.13	.....	.....	15.610
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	W20475	A	1	2.9	23.4	65.2	8.5	.95	.....	.....	14.150
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	W20475	A	2	.....	24.1	67.1	8.8	1.00	.....	.....	15.600
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	W20475	A	3	.....	26.4	73.6	.....	1.10	.....	.....	7.694
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	W20476	A	1	2.6	23.9	67.3	6.2	.85	.....	.....	14.270
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	W20476	A	2	.....	24.5	69.1	6.4	.85	.....	.....	15.650
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	W20476	A	3	.....	26.2	73.8	.....	.91	.....	.....	7.917
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	12366	A	1	1.11	25.68	64.99	8.22	1.18	.....	.....	8.133
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	12366	A	2	.....	25.97	65.72	8.31	1.19	.....	.....	15.640
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	12366	A	3	.....	28.32	71.68	.....	1.30	.....	.....	14.072
Same (face of room 1, right heading 8, off main entry, 2,300 feet east of drift mouth, 3-foot 3½-inch bed and cut).	272	12366	A	3	.....	28.32	71.68	.....	1.30	.....	.....	14.231

α Sample air dried the usual length o time, represents true moisture as received.

Figart, 1½ miles northeast of: Erick No. 2 mine. Middle Kittanning or C bed (face of main heading 2,400 feet from mouth of main entry, 3-foot 2½-inch bed, 2-foot 2½-inch cut).

Same (face of room 1, off second main heading, 400 feet from mouth of main entry, 3-foot 1-inch bed, 2-foot 3½-inch cut).

Same (face of room 5, off main left heading, 850 feet from mouth of main entry, 3-foot 2½-inch bed, 2-foot ¾-inch cut).

Same (face of first left heading, 500 feet from mouth of main entry, 3-foot 1-inch bed, 2-foot 4-inch cut).

Same (face of straight main heading, 1,240 feet from mouth of entry, 2-foot 1½-inch bed, 1-foot 1½-inch cut).

Same (composite of samples W20433, W20434, W20474, W20475, and W20476).

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.					Ultimate.					Calorific value.	
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vol- atile car- mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PENNSYLVANIA—Continued.																
CAMBRIA COUNTY—continued.																
Hastings, 2½ miles northeast of: Miller Run mine, Miller or B bed (face of main air course, 2,000 feet from mine mouth, 4-foot 1-inch bed, 3-foot 3-inch cut).	273	W20440	A	1	3.0	22.4	66.3	8.3	1.40						7,694	13,850
Same (face of room 4, off right entry 5; 200 feet from main entry), 4-foot 1½-inch bed, 3-foot 3½-inch cut).	273	W20441	A	2	2.1	21.9	66.5	9.5	1.75						7,933	14,280
Same (face of right entry 1; 200 feet off left entry 2, 4-foot 1-inch bed, 2-foot 8½-inch cut).	273	W20442	A	1	2.3	22.4	67.0	8.3	.85						7,644	13,760
Same (face of left entry 2; 500 feet off main entry, 4-foot 1½-inch bed, 3-foot 4½-inch cut).	273	W20443	A	2	2.1	23.5	64.7	9.7	1.25						7,806	14,050
Same (composite of sample W20440-W20443).....	273	12371	A	3	.81	23.92	69.15	9.12	1.30						7,733	15,720
Same (pillar of room 5, left entry 1; 300 feet off main entry, 3-foot 11½-inch bed, 3-foot 3½-inch cut).	273	W20447	A	2	2.4	21.0	69.9	6.7	.85						7,611	14,060
1 mile south of: Pennsylvania No. 11 mine, Lower Freeport or D bed (face of right entry 5, off main heading, 5-foot 3½-inch bed, 4-foot 10½-inch cut).	274	12150	A	1	2.78	23.49	67.61	6.12	.97					2.2	7,800	14,040
Same (face of old main heading, 4-foot 8½-inch bed, 4-foot 4½-inch cut).	274	12151	A	3	2.81	23.54	66.65	7.00	.90						7,804	14,155
Same (face of second right cross heading, 4-foot 1-inch bed, 3-foot 9-inch cut).	274	12166	A	2	2.88	23.92	66.34	6.86	1.16						7,860	15,588
Same (face of left heading 3, 3-foot 8-inch bed, 3-foot 4½-inch cut).	274	12167	A	3	3.26	23.50	64.78	8.46	1.37					2.2	7,906	14,230
				2	24.29	24.29	66.96	8.75	1.39						8,094	14,570
				3	26.62	26.62	73.38		.97						8,694	15,630
				1	2.81	23.54	66.65	7.00	1.19						7,800	14,040
				2	24.16	24.16	69.54	6.30	1.27						7,804	14,155
				3	25.78	24.22	69.69	9.19	3.75						8,030	15,588
				1	2.4	21.0	69.9	6.7	4.12						7,906	14,230
				2	21.5	21.6	71.6	6.9							8,094	14,570
				3	23.1	23.1	76.9								8,694	15,630
				1	2.78	23.49	67.61	6.12	2.2						7,945	14,301
				2	24.16	24.16	69.54	6.30	7.93						8,172	14,710
				3	25.78	24.22	69.69	9.19	3.75						8,721	15,698
				1	2.81	23.54	66.65	7.00	4.12						7,856	14,141
				2	24.22	24.22	68.58	7.20							8,083	14,549
				3	26.10	23.90	73.90								8,710	15,078
				1	2.88	23.92	66.34	6.86	2.2						7,845	14,121
				2	24.63	24.63	68.31	7.06	7.93						8,078	14,540
				3	26.50	23.50	73.50		4.12						8,692	15,646
				1	3.26	23.50	64.78	8.46	2.7						7,644	13,759
				2	24.29	24.29	66.96	8.75	7.93						7,902	14,224
				3	26.62	26.62	73.38		1.96						8,660	15,588

TABULATED ANALYSES: PENNSYLVANIA.

Same (composite of samples 12150, 12151, 12165 and 12167).	274	12168	A	1	2.89	23.67	66.34	7.10	1.37	5.02	79.49	1.30	5.72	2.3	7.837	14.107
Same (pillar in room 16, off left entry 3, 4-foot 4½-inch bed, 4-foot 4½-inch cut).	274	12169	A	2	.....	24.38	68.31	7.31	1.41	4.84	81.86	1.34	3.24	.....	8.071	14.628
1 mile south of: Pennsylvania No. 12 mine, Lower Freepot or D bed (face of original old main heading, 5,800 feet from mine mouth, 3-foot 1½-inch bed, 3-foot cut).	274	12152	A	1	3.42	26.30	73.70	6.15	1.52	5.22	88.32	1.45	3.40	.....	8.708	15.674
Same (face of entry 5, off main heading, 4-foot 8-inch bed, 3-foot 10½-inch cut).	274	12153	A	2	.....	23.16	67.27	6.15	1.62	5.10	79.55	1.28	6.30	2.8	7.889	14.710
Same (face of right heading 4, 1½ miles from mine mouth, 3-foot 11½-inch bed, 3-foot 8½-inch cut).	274	12154	A	3	.....	23.98	63.65	6.37	1.68	4.89	82.37	1.33	3.36	.....	8.117	14.611
Same (face of room 1, off entry 1, off right heading 3, 4-foot 4½-inch bed, 4-foot 2½-inch cut).	274	12155	A	2	.....	25.61	74.39	7.93	1.79	5.22	87.97	1.42	3.60	.....	8.669	15.604
Same (face of right entry 3, off main heading, 4-foot 3-inch bed, 3-foot 9-inch cut).	274	12156	A	1	2.28	25.33	64.46	7.93	2.14	.....	.....	.....	.....	1.6	7.777	13.999
Same (composite of samples 12152-12156)	274	12157	A	3	.....	28.21	71.79	8.11	2.19	.....	.....	.....	.....	.....	7.958	14.324
Johnstown, 3 miles south of: Valley No. 1 mine, Upper Kittanning or C bed (face of room 11 in Andy's heading, 1,000 feet west of tippie No. 2, 4-foot bed, 3-foot 11½-inch cut).	275	W19563	A	1	3.00	22.49	67.52	6.99	2.02	.....	.....	.....	.....	2.3	7.828	14.090
Same (face of mine mouth, 4-foot 2-inch bed and southeast of mine mouth, 4-foot 1½-inch cut).	275	W19564	A	2	.....	23.18	69.61	7.21	2.08	.....	.....	.....	.....	.....	8.070	14.526
Same (face of room 4, right heading 8, 3,600 feet heading 12, 4-foot 4½-inch bed, 4-foot 3½-inch cut).	275	W19566	A	3	.....	24.98	75.02	6.97	2.24	.....	.....	.....	.....	.....	8.697	15.655
Same (chain pillar, 4,200 feet northeast of mine mouth, 3-foot 9½-inch bed and cut).	275	W19565	A	1	2.55	24.09	66.39	6.97	1.56	.....	.....	.....	.....	1.9	7.861	14.571
	275	W19567	A	2	.....	24.72	68.13	7.15	1.72	.....	.....	.....	.....	.....	8.067	14.521
	275	W19568	A	3	.....	26.62	73.38	7.99	1.58	.....	.....	.....	.....	2.2	7.750	13.950
	275	W19569	A	1	2.63	23.31	66.07	8.21	1.62	.....	.....	.....	.....	.....	8.671	15.608
	275	W19570	A	2	.....	26.08	73.92	7.25	1.74	.....	.....	.....	.....	2.1	7.821	14.481
	275	W19571	A	3	.....	23.14	69.40	7.46	1.79	.....	.....	.....	.....	.....	8.045	15.647
	275	W19572	A	1	2.73	23.01	74.99	7.48	1.84	4.88	78.80	1.31	5.69	2.0	7.797	14.035
	275	W19573	A	2	.....	24.27	68.04	7.69	1.89	4.71	81.01	1.35	3.35	.....	8.016	14.429
	275	W19574	A	3	.....	26.29	73.71	10.4	2.05	5.10	87.76	1.46	3.63	.....	8.084	15.631
	275	W19575	A	1	2.0	14.0	73.6	10.6	2.10	.....	.....	.....	.....	.....	7.667	13.800
	275	W19576	A	2	.....	14.3	75.1	10.6	2.10	.....	.....	.....	.....	.....	7.817	14.070
	275	W19577	A	3	.....	16.0	84.0	8.4	2.35	.....	.....	.....	.....	.....	8.744	15.740
	275	W19578	A	1	1.9	14.0	74.8	9.3	2.25	.....	.....	.....	.....	.....	7.733	13.920
	275	W19579	A	2	.....	14.3	76.2	9.5	2.30	.....	.....	.....	.....	.....	7.883	14.190
	275	W19580	A	3	.....	15.8	84.2	7.5	2.54	.....	.....	.....	.....	.....	8.711	15.680
	275	W19581	A	1	1.8	14.5	76.2	7.5	2.70	.....	.....	.....	.....	.....	7.950	14.310
	275	W19582	A	2	.....	16.0	84.0	7.6	2.70	.....	.....	.....	.....	.....	8.100	14.580
	275	W19583	A	3	.....	16.0	84.0	7.9	2.76	.....	.....	.....	.....	.....	7.767	15.780
	275	W19584	A	1	2.4	14.4	75.3	7.9	1.00	.....	.....	.....	.....	.....	7.861	14.590
	275	W19585	A	2	.....	14.7	77.2	8.1	1.05	.....	.....	.....	.....	.....	8.050	14.490
	275	W19586	A	3	.....	16.0	84.0	8.1	1.14	.....	.....	.....	.....	.....	7.761	15.770
	275	W19587	A	1	1.32	14.63	75.24	8.81	1.57	4.26	81.19	1.39	2.78	.....	7.804	14.017
	275	W19588	A	2	.....	14.83	76.24	8.93	1.59	4.17	82.28	1.41	1.62	.....	7.909	14.236
	275	W19589	A	3	.....	16.28	83.72	8.8	1.75	4.58	90.35	1.55	1.77	.....	7.685	15.633
	275	W19590	A	1	2.3	14.3	74.6	8.8	2.45	.....	.....	.....	.....	.....	7.789	13.930
	275	W19591	A	2	.....	14.6	76.4	9.0	2.50	.....	.....	.....	.....	.....	7.922	14.260
	275	W19592	A	3	.....	16.0	84.0	8.4	2.75	.....	.....	.....	.....	.....	8.706	15.670

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.		Proximate.					Ultimate.					Calorific value.			
		Laboratory No.	Kind.	Con- dition.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
PENNSYLVANIA—Continued.																	
CAMBRIA COUNTY—continued.																	
Nanty Glo, 1 mile north of; Lincoln No. 1 mine; Lower Kittanning, Miller, or B bed (face of new main heading, 3-foot 4-inch bed and cut). Same (face of right entry 2, 3-foot 5-inch bed and cut). Same (face of right entry 4, 3-foot 4-inch bed and cut). Same (face of left entry 7, 3-foot 6-inch bed and cut). Same (face of left entry 9, 3-foot 5-inch bed and cut). Same (composite of samples 12180, 12181, 12182, 12183, and 12184). One-half mile southeast of; Springfield No. 1 mine, Lower Kittanning or B bed (face of left entry 4, 2,700 feet from mine mouth, 3-foot 4-inch bed and cut). Same (face of main entry, 3,500 feet from mine mouth, 3-foot 8-inch bed and cut). Same (face of third crosscut off dip heading, 2,500 feet from mine mouth, 3-foot 7-inch bed and cut). Same (face of left entry 2, 3,000 feet from mine mouth, 3-foot 8-inch bed and cut).	276	12180	A	1	3.03	19.35	71.18	6.44	1.84					2.4	7,936	14,285	
				2		19.95	73.41	6.64	1.90							8,184	14,751
	276	12181	A	3		21.37	78.63		2.04							8,166	15,779
				1	3.28	18.01	72.23	6.48	1.70						2.6	7,902	14,224
				2		18.62	74.68	6.70	1.76							8,170	14,706
	276	12182	A	3		19.96	80.04		1.89							8,157	15,763
				1	2.84	19.60	71.48	6.08	1.68						2.4	7,980	14,364
				2		20.17	73.57	6.26	1.73							8,213	14,783
	276	12183	A	3		21.52	78.48		1.85							8,162	15,772
				1	2.93	19.69	71.41	5.97	1.58						2.5	7,971	14,348
				2		20.28	73.57	6.15	1.63							8,212	14,782
	276	12184	A	3		21.61	78.39		1.74							8,750	15,750
			1	2.74	19.07	71.20	6.99	2.21						2.3	7,881	14,186	
276	12185	A	3		21.13	78.87		2.27							8,103	14,585	
			2		21.36	78.81		2.45							8,730	15,714	
			1	2.84	19.78	70.89	6.49	1.85	4.87	80.83	1.32	4.64	2.4	7,936	14,285		
276	12128	A	3		20.36	72.96	6.68	1.90	4.68	83.19	1.36	2.19		8,168	14,702		
			2		21.82	78.18		2.04	5.02	89.15	1.46	2.33		8,753	15,755		
			3	3.31	17.71	71.87	7.11	2.00						2.8	7,841	14,114	
			1			18.32	74.33	7.35	2.07						8,109	14,596	
			3		19.77	80.23		2.23							8,753	15,755	
276	12129	A	1	4.31	16.57	72.57	6.55	2.31						3.7	7,795	14,031	
			2		17.32	75.83	6.85	2.41							8,146	14,963	
			3		18.59	81.41		2.59							8,745	15,741	
276	12130	A	1	3.09	17.11	73.28	6.52	2.35						2.5	7,901	14,222	
			2		17.66	75.61	6.73	2.43							8,153	14,675	
			3		18.94	81.06		2.61							8,741	15,734	
276	12131	A	1	2.98	20.78	69.93	6.31	1.88						2.4	7,925	14,265	
			2		21.42	72.08	6.50	1.94							8,168	14,702	
			3		22.91	77.09		2.07							8,736	15,725	

Same (composite of samples 12128, 12129, 12130, 12131).	277	12132	A	1	3.48	17.97	71.73	6.82	2.22	4.74	80.12	1.20	4.90	2.9	7.857	14.143
				2	.....	18.62	74.31	7.07	2.30	4.51	83.01	1.24	1.87	.....	8.141	14.654
				3	.....	20.04	79.96	.....	2.48	4.86	89.33	1.33	2.00	.....	8.761	15.770
Same (pillar in room 3, off left entry 2, 3-foot 9-inch bed and cut).	276	12133	A	1	3.19	17.22	73.83	5.76	1.97	4.79	81.30	1.21	4.97	2.5	7.991	14.384
				2	.....	17.79	76.26	5.95	2.04	4.59	83.98	1.25	2.19	.....	8.255	14.859
				3	.....	18.92	81.08	.....	2.17	4.88	89.30	1.33	2.32	.....	8.778	15.899
Portage, 2 miles north of; Forge slope No. 1 mine, Upper Kittanning or C' bed (face of main south heading, 1 mile south of mine mouth, 3-foot 4½-inch bed and cut).	277	W20396	A	1	2.0	16.3	74.1	7.6	.55	.....	.....	.....	.....	.....	7.872	14.170
				2	.....	16.6	75.6	7.8	.55	.....	.....	.....	.....	.....	8.033	14.400
				3	.....	18.0	82.0	.....	.60	.....	.....	.....	.....	.....	8.711	15.680
Same (on rib, near face of left entry 7, off main south entry, 1 mile west of mine mouth, 3-foot 5-inch bed and cut).	277	W20397	A	1	1.8	18.3	70.0	9.9	2.55	.....	.....	.....	.....	.....	7.656	13.780
				2	.....	18.6	71.3	10.1	2.60	.....	.....	.....	.....	.....	7.794	14.030
				3	.....	20.7	79.3	.....	2.89	.....	.....	.....	.....	.....	8.672	15.610
Same (on rib, near face of right entry 2, off left entry 7, off main south entry, 4,500 feet north-west of mine mouth, 3-foot 5½-inch bed and cut).	277	W20398	A	1	1.8	18.1	70.8	9.3	2.60	.....	.....	.....	.....	.....	7.722	13.900
				2	.....	18.4	72.1	9.5	2.65	.....	.....	.....	.....	.....	7.867	14.160
				3	.....	20.3	79.7	.....	2.93	.....	.....	.....	.....	.....	8.694	15.650
Same (on rib, near face of right entry 1, off left entry 7, off main south heading, 5,000 feet south-west of mine mouth, 3-foot 7½-inch bed and cut).	277	W20399	A	1	2.3	15.1	73.5	9.1	2.25	.....	.....	.....	.....	.....	7.717	13.890
				2	.....	15.5	73.2	9.3	2.30	.....	.....	.....	.....	.....	7.900	14.220
				3	.....	17.1	82.9	.....	2.54	.....	.....	.....	.....	.....	8.711	15.680
Same (face of main north heading, 3,000 feet north of mine mouth, 3-foot 5½-inch bed and cut).	277	W20400	A	1	1.9	16.7	73.4	8.0	1.40	.....	.....	.....	.....	.....	7.828	14.060
				2	.....	17.0	74.8	8.2	1.45	.....	.....	.....	.....	.....	7.978	14.360
				3	.....	18.5	81.5	.....	1.58	.....	.....	.....	.....	.....	8.694	15.650
Same (on rib near face of right entry 3, off main north entry, 2,500 feet north of mine mouth, 3-foot 7-inch bed and cut).	277	W20401	A	1	2.1	17.0	72.5	8.4	1.00	.....	.....	.....	.....	.....	7.772	13.990
				2	.....	17.4	74.0	8.6	1.06	.....	.....	.....	.....	.....	7.939	14.280
				3	.....	19.0	81.0	.....	1.16	.....	.....	.....	.....	.....	8.683	15.630
Same (composite of samples W20396-W20401)....	278	12369	A	1	.94	18.41	71.73	8.92	1.86	4.36	80.10	1.23	3.53	.....	7.823	14.081
				2	.....	18.58	72.42	9.00	1.88	4.30	80.86	1.24	2.72	.....	7.897	14.215
				3	.....	20.42	79.58	.....	2.07	4.73	88.86	1.36	2.98	.....	8.678	15.620
1 mile east of; Miller No. 1 shaft; Lower Kittanning, Miller, or B bed (face of second right dip, 2,800 feet southwest of shaft, 3-foot 2-inch bed, 2-foot 9½-inch cut).	278	11355	A	1	2.94	15.81	75.92	5.33	.72	.....	.....	.....	.....	2.4	.....	.....
				2	.....	16.29	78.22	5.49	.72	.....	.....	.....	.....	.....	.....	.....
				3	.....	17.24	82.76	.....	.76	.....	.....	.....	.....	.....	.....	.....
Same (face of left heading 3, 4,100 feet southeast of shaft, 3-foot 11½-inch bed, 3-foot 7½-inch cut).	278	11356	A	1	2.91	17.58	72.69	6.82	1.68	.....	.....	.....	.....	2.4	.....	.....
				2	.....	18.11	74.87	7.02	1.73	.....	.....	.....	.....	.....	.....	.....
				3	.....	19.48	80.52	.....	1.80	.....	.....	.....	.....	.....	.....	.....
Same (pillar of A-1 heading, 2,000 feet from foot of shaft, 3-foot 5-inch bed, 3-foot 2½-inch cut).	278	11357	A	1	1.85	19.83	71.53	6.79	1.49	.....	.....	.....	.....	1.4	.....	.....
				2	.....	20.20	72.88	6.92	1.52	.....	.....	.....	.....	.....	.....	.....
				3	.....	21.70	78.30	.....	1.63	.....	.....	.....	.....	.....	.....	.....
Same (face of first right dip, 1,500 feet from foot of shaft, 3-foot 10½-inch bed, 3-foot 4½-inch cut).	278	11358	A	1	2.35	17.47	74.09	6.00	.75	.....	.....	.....	.....	1.8	.....	.....
				2	.....	17.89	75.87	6.24	.75	.....	.....	.....	.....	.....	.....	.....
				3	.....	19.08	80.92	.....	.80	.....	.....	.....	.....	.....	.....	.....
Same (face of left heading 1, 3,000 feet from foot of shaft, 3-foot 6-inch bed, 3-foot ½-inch cut).	278	11359	A	1	3.43	17.69	72.25	6.63	1.41	.....	.....	.....	.....	2.9	.....	.....
				2	.....	18.32	74.81	6.87	1.46	.....	.....	.....	.....	.....	.....	.....
				3	.....	19.67	80.33	.....	1.57	.....	.....	.....	.....	.....	.....	.....
Same (composite of samples 11355-11359).....	278	11360	A	1	2.87	17.63	73.21	6.29	1.22	4.51	81.09	1.23	5.06	2.2	7.940	14.292
				2	.....	18.15	75.37	6.48	1.26	4.31	84.10	1.27	2.58	.....	8.175	14.713
				3	.....	19.41	80.59	.....	1.35	4.61	89.93	1.36	2.75	.....	8.740	15.732

Table of chemical analyses—(Continued).

Mine notes (page).	Locality, bed, etc.	Sample.			Proximate.				Ultimate.					Caloric value.		
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
2	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PENNSYLVANIA—Continued.																
CAMBRIA COUNTY—continued.																
279	Portage, 2½ miles east of; Plymouth No. 1 mine, Upper Kittanning or C' bed (face of dip 5,300 feet from main heading, 3-foot 7½-inch bed, 3-foot 7-inch cut).	W17110	A	1 2 3	3.3	17.5 18.0 19.3	72.6 73.2 80.7	6.6 6.8	.70 .75 .80	.....	.....	.....	.....	.....	7,861 8,133 8,728	14,150 14,040 15,710
279	Same (face of left entry 4, 2,000 feet from main heading, 3-foot 8½-inch bed, 3-foot 8-inch cut).	W17111	A	1 2 3	3.5	17.5 18.1 19.8	70.7 73.3 80.2	8.3 8.6	1.50 1.60 1.75	.....	.....	.....	.....	.....	7,694 7,972 8,722	13,850 14,350 15,700
279	Same (face of main heading, 250 feet from left entry 8, 3-foot ½-inch cut).	W17112	A	1 2 3	3.3	16.5 17.0 18.4	72.9 73.5 81.6	7.3 7.5	.70 .76 1.09	.....	.....	.....	.....	.....	7,817 8,083 8,739	14,070 14,550 15,730
279	Same (composite samples of W17110, W17111, and W17112).	11705	A	1 2 3	1.95 ..... .....	.....	.....	7.00 7.75	1.05 1.16	4.45 4.31 4.67	78.35 79.91 86.62	1.18 1.20 1.30	7.37 5.76 6.25	.....	.....	.....
280	1 mile east of; Sonman No. 2 shaft, Lower Kittanning or B bed (pillar near face of room 23, first right off plane, 3,000 feet southeast of shaft, 3-foot 11-inch bed, 3-foot 7-inch cut).	W19089	A	1 2 3	2.5	15.3 15.7 16.8	76.0 77.9 83.2	6.2 6.4	.65 .65 .69	.....	.....	.....	.....	.....	8,039 8,239 8,800	14,470 14,830 15,840
280	Same (face of "No. 32 crook," off main north heading, 4-foot 3½-inch bed, 3-foot 7½-inch cut).	W19691	A	1 2 3	2.6	16.3 16.7 17.9	74.6 76.6 82.1	6.5 6.7	1.65 1.70 .....	.....	.....	.....	.....	.....	7,956 8,172 8,756	14,320 14,710 15,760
280	Same (face of "No. 28 crook," left heading 1, off dip, off main south heading, 3-foot 11½-inch bed, 3-foot 4½-inch cut).	W19692	A	1 2 3	2.5	15.9 16.3 17.3	76.1 78.1 82.7	5.5 5.6	.65 .65 .69	.....	.....	.....	.....	.....	8,083 8,286 8,778	14,550 14,915 15,800
280	Same (composite of samples W19689, W19691, and W19692).	12217	A	1 2 3	1.43	16.92 17.17 18.37	75.22 76.31 81.63	6.43 6.52	1.08 1.10 1.18	4.50 4.40 4.71	83.40 84.61 90.51	1.30 1.32 1.41	3.29 2.65 2.19	.....	8,087 8,204 8,776	14,557 14,767 15,797
280	Same (face of room 8, left heading 2, off dip off main south heading, 3-foot 3-inch bed, 3-foot 3-inch cut).	W19688	A	1 2 3	1.7	16.3 16.6 18.0	74.4 75.7 82.0	7.6 7.7	.65 .65 .70	.....	.....	.....	.....	.....	7,933 8,072 8,744	14,280 14,530 15,740

280	W 19690	A	1	2.5	15.4	76.6	5.5	1.15				8,094	14,570	
			2										8,300	14,940
			3										8,794	15,830
280	W 19693	A	1	2.2	16.1	73.0	6.7	1.30				7,978	14,360	
			2										8,156	14,680
			3										8,756	15,760
280	W 19694	A	1	4.2	15.4	74.9	5.5	1.45				7,967	14,340	
			2										8,317	14,970
			3										8,817	15,870
280	12205	A	1	1.44	15.96	76.34	6.26	1.98	4.44	83.35	1.19	3.78	8,101	14,582
			2								8,219	14,794		
			3								8,776	15,797		
281	12144	A	1	4.54	22.74	67.62	5.10	1.63	4.63	90.30	1.29	2.72	8,776	15,797
			2								8,241	14,834		
			3								8,706	15,671		
281	12145	A	1	2.40	25.79	65.82	5.99	1.18			1.4	7.965	14,337	
			2								8,161	14,690		
			3											
281	12146	A	3					1.29				8,695	15,651	
			1	3.02	26.59	64.34	6.05	1.74		2.1	7.902	14,224		
			2								8,148	14,666		
281	12147	A	3					1.91				8,691	15,644	
			1	2.65	26.48	62.86	8.01	1.56		1.9	7.771	13,988		
			2								7,982	14,368		
281	12148	A	3					1.60				8,698	15,656	
			1	3.14	26.01	60.40	6.45	1.37	5.08	70.55	1.30	6.25	8,866	14,159
			2								4.88	82.13	1.34	3.58	8,121	14,618
281	12126	A	3					1.51				8,701	15,662	
			1	4.86	21.85	67.48	5.81	1.01	3.9	7.804	14,047			
			2								8,203	14,765		
281	12127	A	3					1.06				8,737	15,727	
			1	2.55	22.53	68.11	6.81	1.20		1.7	7.894	14,209		
			2								8,101	14,582		
281	12140	A	3					1.32				8,710	15,678	
			1	2.83	23.17	67.53	6.47	1.57	2.3	7.821	14,078			
			2								8,049	14,488		
281	12141	A	3					1.62				8,624	15,523	
			1	2.70	23.73	66.86	6.71	1.39	2.0	7.904	14,227			
			2								8,123	14,621		
281	12142	A	3					1.43				8,725	15,705	
			1	2.61	23.74	67.62	6.03	1.95	1.9	7.968	14,342			
			2								8,182	14,728		
282	12143	A	3					1.04				8,722	15,700	
			1	3.08	22.97	67.60	6.55	1.24	4.90	80.54	1.36	5.41	7,856	14,141
			2								4.71	83.10	1.40	2.75	8,106	14,591
282	12141, and 12142).	A	3					1.28				8,106	14,591	
			1	3.08	22.97	67.60	6.55	1.24	4.90	80.54	1.36	5.41	7,856	14,141
			2								4.71	83.10	1.40	2.75	8,106	14,591

Same (face of room 13, off left heading 1, off dip, off main south heading, 4-foot 4½-inch bed, 3-foot 10-inch cut).

Same (face of room 10, first right off plane 17, off main north heading, 4-foot 5-inch bed, 3-foot 9½-inch cut).

Same (face of right heading 3, off main dip, off main north heading, 4-foot 4-inch bed, 3-foot 10½-inch cut).

Same (composite of samples W 19688, W 19690, W 19693, and W 19694).

Spangler, 2 miles northwest of; Pennsylvania No. 21 mine, D or Lower Freeport bed (face of main heading, 5,000 feet southwest of mine mouth, 3-foot 9-inch bed, 3-foot 7-inch cut).

Same (face of second main entry, 6,500 feet from mine mouth, 3-foot 5½-inch bed, 2-foot 10-inch cut).

Same (face of back heading 17, 5,900 feet west of mine mouth, 3-foot 6-inch bed, 2-foot 8½-inch cut).

Same (face of right entry 4, off second main entry, 6,300 feet east of mine mouth, 3-foot 7½-inch bed, 3-foot 5-inch cut).

Same (composite of samples 12144-12147.

2 miles northwest of; Pennsylvania No. 22 mine, Lower Freeport or D bed (face of ninth main entry, 7,200 feet southwest of mine mouth, 3-foot 9-inch cut).

Same (rib of room 9, off right entry 4, off ninth main entry, 6,200 feet southwest of mine mouth, 3-foot 7½-inch cut).

Same (face of room 17, off right entry 6, off ninth main entry, 7,400 feet from mine mouth, 3-foot 9½-inch cut).

Same (face of main back heading, 7,100 feet from mine mouth, 3-foot 2-inch cut).

Same (face of fourteenth right, off main heading, 7,200 feet from mine mouth, 3-foot 1½-inch cut).

Same (composite of samples 12126, 12127, 12140, 12141, and 12142).

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.					Ultimate.					Calorific value.	
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PENNSYLVANIA—Continued.																
CAMBRIA COUNTY—Continued.																
Twin Rocks, near: Big Bend No. 1 mine, Miller, B, or Lower Kittanning bed (face of room 11, off drainage heading, 2,600 feet northeast of main opening, 3-foot 7½-inch bed and cut).	282	W19668	A	1	2.4	20.0	71.7	5.9	1.70						8,094	14,570
				2		20.5	73.5	6.0	1.75						8,294	14,930
				3		21.8	78.2		1.86						8,828	15,890
Same (face of water-level heading, 2,000 feet northeast of main opening, 3-foot 6½-inch bed and cut).	282	W19669	A	1	1.9	19.7	72.4	6.0	.60						8,078	14,540
				2		20.1	73.8	6.1	.64						8,239	14,830
				3		21.4	78.6								8,772	15,790
Same (composite of samples W19668 and W19669)	282	12215	A	1	1.29	20.56	72.15	6.00	1.74	4.75	82.96	1.33	3.22		8,122	14,620
				2		20.83	73.09	6.08	1.76	4.67	84.05	1.35	2.09		8,228	14,810
				3		22.18	77.82		1.87	4.97	89.49	1.44	2.23		8,760	15,768
Same (pillar opposite room 16, off Claghorn section, 3,000 feet east of main opening, 3-foot 7½-inch bed).	282	W19672	A	1	2.0	19.5	73.0	5.5	1.50						8,078	14,540
				2		19.9	74.5	5.6	1.55						8,244	14,840
				3		20.1	78.9		1.64						8,739	15,730
Same (pillar to left of main heading, 2,500 feet east of main opening, 3-foot 7½-inch bed).	282	W19674	A	1	2.2	20.0	72.7	5.1	1.45						8,156	14,680
				2		20.5	74.3	5.2	1.50						8,344	15,020
				3		21.6	78.4		1.58						8,800	15,840
Same (pillar to left of main heading, opposite right headings 6 and 7, 2,000 feet east of main opening, 4-foot 3-inch bed and cut).	282	W19676	A	1	2.6	20.3	72.2	4.9	1.15						8,106	14,590
				2		20.8	74.2	5.0	1.20						8,322	14,980
				3		21.9	78.1		1.26						8,761	15,770
Same (composite of samples W19672, W19674, and W19676).	282	12208	A	1	1.32	20.33	73.01	5.34	1.39	4.66	83.45	1.33	3.83		8,201	14,762
				2		20.60	73.99	5.41	1.41	4.57	84.57	1.35	2.69		8,311	14,959
				3		21.78	78.22		1.49	4.83	89.41	1.43	2.84		8,786	15,815
1 mile north of: Big Bend No. 6 mine, Miller, B, or Lower Kittanning bed (room 1, left side of right heading 1, off No. 9 drift, 900 feet south of No. 9 opening, 3-foot 9½-inch bed, 3-foot 9½-inch cut).	283	W19670	A	1	2.7	18.9	72.6	5.8	1.75						8,017	14,430
				2		19.4	74.6	6.0	1.80						8,239	14,830
				3		20.6	79.4		1.91						8,767	15,780
Same (face of heading 13, 325 feet from outcrop and 3,500 feet southeast from main opening, 3-foot 9½-inch bed, 3-foot 8½-inch cut).	283	W19673	A	1	3.2	18.7	73.2	4.9	.95						8,011	14,420
				2		19.3	75.6	5.1	1.00						8,278	14,900
				3		20.3	79.7		1.05						8,722	15,700
Same (face of room 10 on left side of No. 9 drift, 700 feet southwest of No. 9 opening, 3-foot 8½-inch bed, 3-foot 8½-inch cut).	283	W19677	A	1	2.6	20.0	72.1	5.3	1.00						8,061	14,510
				2		20.5	74.1	5.4	1.05						8,272	14,890
				3		21.7	78.3		1.11						8,739	15,730

Same (composite of samples W 19670, W 19673, and W 19677).	283	12227	A	1	1.54	20.67	72.37	5.42	1.40	4.73	83.20	1.38	3.87	8.138	14.648
				2	20.39	72.51	5.50	1.42	4.63	84.50	1.40	2.55	8.265	14.877	
Same (pillar between rooms 23 and 24, off main heading, 1,500 feet northeast of main opening, 3-foot 7½-inch bed).	283	W 19671	A	1	2.8	22.21	77.79	5.3	1.50				8.746	15.743	
				2	19.4	72.5	5.4	1.10					8.006	14.410	
Same (pillar between rooms 27 and 28, off main heading, 2,000 feet northeast of main opening, 3-foot 9½-inch cut).	283	W 19675	A	1	2.2	21.0	79.0	5.4	1.22				8.233	15.690	
				2	20.1	74.4	5.5	1.15	4.10				8.106	14.590	
Same (composite of samples W 19671 and W 19675).	283	12207	A	1	1.47	20.18	72.91	5.44	1.20	4.75	83.43	1.27	3.91	8.169	14.920
				2	20.48	74.00	5.52	1.22	4.66	84.67	1.29	2.64	8.289	15.780	
				3	21.98	78.32		1.22	4.93	89.61	1.37	2.80	8.767	15.795	
				3	3.1	18.3	71.6	7.0	2.10				7.867	14.160	
Commercial No. 3 mine, Miller or B bed (face of main heading, 6,200 feet northwest of mine mouth, 5-foot 4-inch bed, 3-foot 10½-inch cut).	284	W 20477	A	1	2.1	18.9	73.9	7.2	2.15				8.117	14.610	
Same (face of right heading 7,450 feet off main entry and 5,600 feet northwest of mine mouth, 3-foot 6½-inch bed, 3-foot 6-inch cut).	284	W 20479	A	1	2.1	20.2	70.4	7.3	2.32				8.744	15.740	
				2	20.6	71.9	7.5	2.80	2.75				7.906	14.230	
Same (face of left entry 7,700 feet off main entry and 5,300 feet northwest of mine mouth, 3-foot 11½-inch bed and cut).	284	W 20480	A	1	2.9	22.3	77.7	7.9	3.03				8.072	14.530	
				2	18.3	73.6	8.1	6.0	3.03				8.028	14.450	
Same (face of right heading 5,500 feet off main entry and 4,200 feet north of mine mouth, 3-foot 8½-inch bed and cut).	284	W 20481	A	1	2.2	19.4	80.1	5.7	1.60				8.267	14.880	
Same (composite of samples W 20477, W 20479, W 20480, and W 20481).	284	12377	A	1	.82	20.42	72.11	6.65	1.96				8.789	15.820	
				2	20.59	72.70	6.71	2.37	2.35	4.45	81.89	1.22	3.39	8.083	14.549
				3	22.07	77.93		2.54	4.77	88.51	1.32	2.86	8.736	15.725	
				3	1.8	20.0	71.5	6.7	1.70				8.011	14.420	
Same (pillar on right heading 4,500 feet off main entry and 4,500 feet northeast of mine mouth, 3-foot 6-inch bed, 3-foot 5½-inch cut).	284	W 20478	A	1	3.3	21.9	78.1	6.8	1.75				8.156	14.680	
				2	17.5	76.5	6.0	1.81	1.60				8.756	15.760	
Commercial No. 4 mine, lower Kittanning or B bed (face of main entry 3, off No. 4 slope, 3-foot 7½-inch bed and cut).	285	W 17061	A	1	3.3	17.0	73.9	5.8	1.70				7.978	14.360	
				2	17.5	76.5	6.0	1.75	1.84				8.250	15.800	
Same (100 feet from face of main heading, 5,290 feet north of mine mouth, 3-foot 8-inch bed and cut).	285	W 20501	A	1	3.8	18.1	71.9	6.2	1.85				7.878	14.180	
				2	18.8	74.8	6.4	1.95	1.84				8.189	14.740	
				3	20.1	73.9		2.08	1.85				7.744	15.740	
Same (face of east entry 6, off right entry 3, off main entry, 4,400 feet northeast of mine mouth, 3-foot 8½-inch bed and cut).	285	W 20505	A	1	2.4	19.0	72.3	6.3	1.85				7.956	14.320	
				2	19.5	74.0	6.5	1.90	1.80				8.156	14.680	
Same (rib near face of east entry 7, off right entry 3, off main entry, 4,800 feet northeast of mine mouth, 3-foot 1½-inch bed and cut).	285	W 20506	A	1	3.0	18.3	73.1	5.6	2.03				8.722	15.700	
				2	18.9	73.3	5.8	1.50	1.45				8.011	14.420	
Same (face of right entry 3, off main entry, 4,900 feet northeast of mine mouth, 3-foot 7-inch cut).	285	W 20508	A	1	3.3	20.1	72.9	5.6	1.39				8.256	14.860	
				2	18.2	72.9	5.6	1.75	1.39				7.961	14.330	
				3	18.8	75.4	5.8	1.80	1.80				8.239	14.830	
Same (composite of samples W 20501, W 20505, W 20506, and W 20508).	285	12364	A	1	.89	19.73	73.30	6.08	1.91				8.750	15.750	
				2	19.91	73.96	6.13	1.97	1.95	4.58	83.16	1.28	2.95	8.090	14.562
				3	21.21	78.99		2.10	1.97	4.52	83.91	1.29	2.18	8.163	14.693
Same (sixth pillar on east entry 9, off right entry 2, off main entry, 3,800 feet northeast of mine mouth, 3-foot 4½-inch cut).	285	W 20503	A	1	2.8	18.6	72.9	5.7	2.10	4.82	89.39	1.37	2.32	7.983	14.370
				2	19.1	75.0	5.9	1.60	4.82	89.39	1.37	2.32	8.217	14.790	
				3	20.3	79.7		1.70	4.82	89.39	1.37	2.32	8.733	15.720	

Commercial No. 3 mine, Miller or B bed (face of main heading, 6,200 feet northwest of mine mouth, 5-foot 4-inch bed, 3-foot 10½-inch cut).

Same (face of right heading 7,430 feet off main entry and 5,600 feet northwest of mine mouth, 3-foot 6½-inch bed, 3-foot 6-inch cut).

Same (face of left entry 7,700 feet off main entry and 5,300 feet northwest of mine mouth, 3-foot 11½-inch bed and cut).

Same (face of right heading 5,500 feet off main entry and 4,200 feet north of mine mouth, 3-foot 8½-inch bed and cut).

Same (composite of samples W 20477, W 20479, W 20480, and W 20481).

Same (pillar on right heading 4,500 feet off main entry and 4,500 feet northeast of mine mouth, 3-foot 6-inch bed, 3-foot 5½-inch cut).

Commercial No. 4 mine, lower Kittanning or B bed (face of main entry 3, off No. 4 slope, 3-foot 7½-inch bed and cut).

Same (100 feet from face of main heading, 5,200 feet north of mine mouth, 3-foot 8-inch bed and cut).

Same (face of east entry 6, off right entry 3, off main entry, 4,000 feet northeast of mine mouth, 3-foot 8½-inch bed and cut).

Same (rib near face of east entry 7, off right entry 3, off main entry, 4,800 feet northeast of mine mouth, 3-foot 1½-inch bed and cut).

Same (face of right entry 3, off main entry, 4,900 feet northeast of mine mouth, 3-foot 7-inch cut).

Same (composite of samples W 20501, W 20505, W 20506, and W 20508).

Same (sixth pillar on east entry 9, off right entry 2, off main entry, 3,800 feet northeast of mine mouth, 3-foot 4½-inch cut).

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.		Proximate.					Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed carb.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PENNSYLVANIA—(continued).																
CAMBRIA COUNTY—continued.																
Twin Rocks, 1 mile north of; Commercial No. 5 mine, Miller or B bed (face of room 1, off east heading 10, off main entry, 3-foot 8-inch bed).	286	W17062	A	1	3.3	20.0	72.3	4.4	.90						8,106	14,590
				2	.....	20.5	74.9	4.6	.95						8,383	15,090
				3	.....	21.5	78.5		1.00						8,789	15,820
Same (face of main heading, 4,700 feet northeast of mine mouth, 3-foot 7½-inch bed and cut).	286	W20499	A	1	2.8	18.8	72.4	6.0	2.05						7,972	14,350
				2	.....	19.3	74.5	6.2	2.10						8,200	14,760
				3	.....	20.6	79.4		2.24						8,744	15,740
Same (face of room 7, off right heading 1; 500 feet from second parallel entry and 3,400 feet northeast of mine mouth; 3-foot 5½-inch cut).	286	W20500	A	1	2.9	19.2	72.1	5.8	1.70						8,028	14,450
				2	.....	19.8	74.2	6.0	1.75						8,267	14,880
				3	.....	21.1	78.9		1.86						8,794	15,830
Same (face of east heading 12; 325 feet off main entry, 4,000 feet northeast of mine mouth, 3-foot 8½-inch bed, 3-foot 8-inch cut).	286	W20502	A	1	2.9	18.9	72.5	5.7	2.00						8,000	14,400
				2	.....	19.5	74.6	5.9	2.03						8,239	14,830
				3	.....	20.7	79.3		2.18						8,756	15,760
Same (east heading 11; 800 feet off main entry, 4,000 feet northeast of mine mouth, 3-foot 6½-inch cut).	286	W20504	A	1	2.8	19.2	73.4	6.7	2.15						7,956	14,320
				2	.....	19.7	73.4	6.9	2.20						8,183	14,730
				3	.....	21.2	78.8		2.36						8,789	15,820
Same (face of room 10, off east heading 10; 750 feet off main heading, 3,900 feet northeast of mine mouth, 3-foot 8½-inch bed and cut).	286	W20507	A	1	3.2	18.2	71.9	6.7	2.15						7,894	14,210
				2	.....	18.8	74.3	6.9	2.25						8,156	14,680
				3	.....	20.2	79.8		2.42						8,761	15,770
Same (composite of samples W20499, W20500, W20502, W20504, and W20507).	286	12375	A	1	.81	20.78	72.10	6.31	2.24	4.60	82.42	1.21	3.22		8,073	14,531
				2	.....	20.95	72.69	6.36	2.26	4.55	83.10	1.22	3.51		8,139	14,650
				3	.....	22.37	77.63		2.41	4.86	88.74	1.30	2.69		8,692	15,646
CENTER COUNTY.																
Osceola Mills, ½ mile south of; Electric mine, Lower Kintanning or B bed (face of right entry 1, off new drift entry, 4-foot 10-inch bed, 3-foot 9-inch cut).	287	12067	A	1	3.45	20.57	68.55	7.43	1.84					2.8	7,771	13,888
				2	.....	21.30	71.00	7.70	1.91						8,048	14,486
				3	.....	23.08	76.92		2.07						8,719	15,694
Same (pillar at room 7, off right entry 4, off main heading, 4-foot 10½-inch bed, 3-foot 11½-inch cut).	287	12069	A	1	3.28	21.61	67.75	7.36	2.01					2.3	7,742	13,936
				2	.....	22.34	70.05	7.61	2.08						8,004	14,407
				3	.....	24.18	75.82		2.25						8,664	15,595
Same (pillar at room 5, off left entry 5, off main heading, 4-foot 10½-inch bed, 3-foot 9½-inch cut).	287	12070	A	1	3.09	20.73	67.90	8.28	2.53					2.4	7,674	13,777
				2	.....	21.39	70.07	8.54	2.61						7,898	14,216
				3	.....	23.39	76.61		2.85						8,636	15,545

Same (composite of samples 12067, 12069, and 12070).	287	12071	A	1	3.24	20.65	68.34	7.77	2.08	4.89	77.85	1.25	6.16	2.5	7.726	13,907
	2			2	21.34	20.65	70.63	8.03	2.15	4.68	80.46	1.29	3.39	2.5	7.985	14,373
Same (pillar at room 9, off left entry 5, off main entry, 5-foot 2½-inch bed, 4 foot 1½-inch cut).	287	12068	A	3	23.20	20.65	76.80	7.71	1.63	5.09	87.48	1.40	3.69	2.5	8,682	15,626
	1			1	3.48	20.26	68.55	7.71	2.11	4.82	78.45	1.26	6.13	2.5	7,715	13,887
	2			2	20.99	71.02	7.99	1.84	1.69	4.59	81.28	1.31	3.14	2.5	7,994	14,389
Same (composite of samples 12068, 12069, and 12070).	287	12190	A	3	22.81	77.19	6.93	1.84	1.84	4.99	88.34	1.42	3.41	2.5	8,688	15,638
	1			1	3.04	22.92	67.32	6.93	1.54	4.95	79.49	1.33	5.97	2.4	8,851	14,132
	2			2	23.64	69.43	6.93	1.54	1.59	4.75	81.99	1.37	3.37	2.5	8,098	14,576
	3			3	25.40	74.60	6.93	1.71	1.71	5.10	88.10	1.47	3.62	1.9	8,701	15,662
1 mile north of: Moshannon No. 10 mine. Lower Kittanning or B bed (on rib of room 18, off left entry 2, off right entry 4, 40 feet from left entry 2, 4-foot 6½-inch bed, 3-foot 7½-inch cut).	287	12057	A	1	2.59	21.53	68.38	7.50	1.91					1.9	7,835	14,103
	2			2	22.10	70.20	7.70	2.12	1.96					2.12	8,043	14,477
	3			3	23.94	76.06									8,714	15,685
Same (face of room 21, off left main heading, 4-foot 5-inch bed, 3-foot 3½-inch cut).	287	12058	A	1	2.67	22.09	68.48	6.76	2.00					2.1	7,883	14,189
	2			2	22.70	70.35	6.95	6.95	2.05						8,099	14,578
	3			3	24.90	75.60			2.20						8,704	15,607
Same (face of room 16, off right main heading, near first crosscut to right, 4-foot 3½-inch bed, 3-foot 8½-inch cut).	287	12059	A	1	2.75	19.59	70.35	7.31	2.11					2.2	7,839	14,110
	2			2	20.14	72.34	7.32	7.32	2.17						8,061	14,510
	3			3	21.78	78.22			2.35						8,716	15,689
Same (face of right heading 1, 3-foot 8½-inch bed, 3-foot 3-inch cut).	287	12060	A	1	3.80	19.98	69.09	7.13	1.73					3.2	7,779	14,002
	2			2	20.77	71.82	7.41	1.80	1.80						8,086	14,555
	3			3	22.43	77.57			1.94						8,733	15,719
Same (face of room 16, off right heading 2, 3-foot 5½-inch bed, 2-foot 6½-inch cut).	287	12061	A	1	3.03	21.25	67.95	7.77	2.48					2.5	7,750	13,950
	2			2	21.91	70.08	8.01	8.01	2.56						7,992	14,386
	3			3	23.82	76.18			2.78						8,688	15,638
Same (composite of samples 12057-12061).....	288	12062	A	1	3.05	21.65	67.95	7.35	1.98					2.4	7,798	14,036
	2			2	22.33	70.09	7.58	7.58	2.04						8,044	14,479
	3			3	24.16	75.84			2.21						8,704	15,667
1 mile south of: Weston mine. Lower Kittanning or B bed (face of left entry 4, off main entry, 4-foot 5½-inch bed, 3-foot 7½-inch cut).	288	12063	A	1	3.20	19.52	68.74	8.54	2.35					2.5	7,664	13,795
	2			2	20.17	71.01	8.82	8.82	2.43						7,918	14,252
	3			3	22.12	77.88			2.66						8,684	15,631
Same (rib of main heading at left entry 7, 5-foot 1½-inch bed, 4-foot 4-inch cut).	288	12064	A	1	2.91	19.53	70.53	7.03	1.80					2.2	7,832	14,098
	2			2	20.12	72.61	7.24	7.24	1.92						8,067	14,521
	3			3	21.69	78.31			2.07						8,697	15,655
Same (composite of samples 12063 and 12064).....	288	12066	A	1	3.08	20.27	68.83	7.82	2.11					2.4	7,734	13,957
	2			2	20.91	71.02	8.07	8.07	2.18						8,401	14,402
	3			3	22.75	77.25			2.37						8,703	15,665
Same (pillar at room 8, off right entry 1, off main heading, 4-foot 7-inch cut).	288	12065	A	1	2.94	19.89	69.68	7.49	1.93					2.2	7,822	14,080
	2			2	20.49	71.79	7.72	7.72	1.99						8,059	14,506
	3			3	22.21	77.79			2.16						8,721	15,721
					23.37	76.63									8,734	
CLEARFIELD COUNTY.																
Boardman; Potts Run No. 3 mine. Lower Kittanning or B bed (face of right entry 3, off main entry, 1,400 feet southwest of mine mouth, 3-foot 7½-inch bed, 3-foot 6½-inch cut).	289	12093	A	1	2.74	20.75	67.85	8.66	1.59					2.0	7,724	13,903
	2			2	21.34	69.76	8.90	8.90	1.79						7,942	14,296
	3			3	23.42	76.58									8,718	15,692
Same (on rib, 100 feet from face of right entry 4, off main entry 1,700 feet southwest of mine mouth, 3-foot 7½-inch bed, 3-foot 7½-inch cut).	289	12094	A	1	2.37	20.82	68.14	8.67	1.53					1.7	7,749	13,948
	2			2	21.33	69.79	8.88	8.88	1.57						7,937	14,287
	3			3	23.41	76.59			1.72						8,711	15,680
Same (face of left entry 3, off main entry, 1,680 feet northeast of mine mouth, 3-foot 6½-inch bed, 3-foot 6-inch cut).	289	12095	A	1	2.80	20.65	67.69	8.86	1.38					2.1	7,719	13,894
	2			2	21.24	69.64	9.12	9.12	1.42						7,941	14,294
	3			3	23.37	76.63			1.56						8,738	15,728

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.			Ultimate.					Calorific value.			
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PENNSYLVANIA—Continued.																
CLEARFIELD COUNTY—continued.																
Boardman; Potts Run No. 3 mine, Lower Kittanning or B bed (face of main heading, 2,000 feet north of mine mouth, 3-foot 1½-inch bed, 3-foot 9-inch cut).	289	12096	A	1	3.38	20.50	67.75	8.37	1.08					2.7	7,697	13,855
				2		21.22	70.12	8.06	1.12					7,906	14,339	
				3		23.23	76.77							8,721	15,698	
Same (face of room 12, off right entry 2, off main entry, 3-foot 7½-inch bed, 3-foot 5½-inch cut).	289	12097	A	1	3.04	21.22	66.83	8.91	1.41				2.3	7,698	13,856	
				2		21.89	68.92	9.19	1.45					7,940	14,292	
				3		24.11	75.89		1.60					8,714	15,739	
Same (composite of samples 12093-12097).	289	12098	A	1	2.95	21.29	66.92	8.84	1.35	4.74	78.51	1.19	5.37	2.2	7,723	13,901
				2		21.94	68.95	9.11	1.39	4.54	80.90	1.23	2.83		7,958	14,324
				3		24.14	75.86		1.53	4.90	89.01	1.35	3.12		8,755	15,759
Brisbin, 1 mile southwest of; Lenore No. 1 mine, Upper Freeport or E bed (face of left heading, off main heading, off No. 1 drift, 2-foot 7-inch bed and cut).	290	12046	A	1	3.00	21.59	67.61	7.80	.79				1.9	7,786	14,015	
				2		22.26	69.70	8.04	.81					8,027	14,449	
				3		24.21	75.79		.88					8,729	15,712	
1 mile southwest of; Lenore No. 2 mine, Upper Freeport or E bed (face of left heading 3, off No. 2 drift, 2 foot 7½-inch bed and cut).	290	12044	A	1	3.14	21.77	66.12	8.97	1.08				2.0	7,690	13,842	
				2		22.48	68.26	9.26	1.11					7,939	14,290	
				3		24.77	75.23		1.22					8,749	15,748	
Same (face of left heading 2, off No. 2 drift, 2-foot 6½-inch bed and cut).	290	12045	A	1	2.83	21.78	67.89	7.50	.91	4.92	79.68	1.33	5.66	1.9	7,882	14,188
				2		22.41	69.87	7.72	.94	4.74	82.00	1.37	3.23		8,111	15,818
				3		24.29	75.71		1.02	5.14	88.86	1.48	3.50		7,787	13,963
Same (composite of samples 12044 and 12046).	290	12047	A	1	3.07	21.47	67.26	8.20	.94	4.80	78.48	1.23	6.35	2.0	7,757	13,963
				2		22.15	69.39	8.46	.97	4.60	80.97	1.27	3.73		8,003	14,405
				3		24.20	75.80		1.06	5.03	88.45	1.39	4.07		8,742	15,739
Madera, 1 mile east of; Morgan Run mine, Lower Kittanning or B bed (face of south entry 4, off right entry 5, 3-foot 5½-inch bed, 3-foot 4-inch cut).	290	W20402	A	1	1.6	18.6	69.4	10.4	2.55					7,678	13,820	
				2		18.9	70.5	10.6	2.60					7,800	14,040	
				3		21.1	78.9		2.91					8,722	15,700	
2 miles north of; Buckner mine, Lower Kittanning or B bed (left entry 9, off cross heading 1, 3,400 feet north-east of mouth of main entry, 3-foot 1½-inch bed, 2-foot 11-inch cut).	290	W20435	A	1	2.3	18.7	68.5	10.5	1.00					7,606	13,690	
				2		19.1	70.2	10.7	1.05					7,483	14,010	
				3		21.4	78.6		1.18					8,711	15,680	
Same (face of right heading 8, 3,800 feet north-east of mouth of main heading, 3-foot 3-inch bed, 3-foot 2½-inch cut).	290	W20436	A	1	2.1	20.0	68.9	9.0	1.45					7,767	13,980	
				2		20.4	70.4	9.2	1.50					7,933	14,294	
				3		22.5	77.5		1.65					8,739	15,730	

290	W 20437	A	1	2.4	19.9	68.2	9.5	1.20	7.700	13.800
			2	.....	20.4	69.9	9.7	1.25	7.889	14.200
			3	.....	22.6	77.4	.....	1.38	8.739	15.700
290	W 20438	A	2	2.3	19.5	70.2	8.0	1.15	7.839	14.110
			2	.....	19.9	71.9	8.2	1.20	8.017	14.430
			3	.....	21.7	78.3	.....	1.31	8.733	15.720
290	W 20439	A	3	2.3	20.4	69.0	8.3	1.20	7.756	13.900
			2	.....	20.9	70.6	8.5	1.25	7.939	14.290
			3	.....	22.8	77.2	.....	1.37	8.772	15.790
290	12376	A	1	.80	21.36	68.48	9.36	1.09	80.07	3.61
			2	.....	21.53	69.03	9.44	1.38	4.44	80.72
			3	.....	23.77	76.23	.....	1.53	4.90	89.13
290	W 20403	A	3	1.9	19.1	68.5	10.5	1.75	8.671	15.008
			2	.....	19.5	69.8	10.7	1.80	7.706	15.090
			3	.....	21.8	78.2	.....	2.02	7.750	13.950
290	W 20404	A	1	2.0	18.6	67.4	12.4	3.15	8.678	15.620
			2	.....	18.6	68.7	12.7	3.20	7.411	13.340
			3	.....	21.3	78.7	.....	3.67	7.561	13.610
290	W 20405	A	1	2.0	18.7	68.3	11.0	3.30	8.661	15.590
			2	.....	19.1	69.7	11.2	3.35	7.550	13.590
			3	.....	21.5	78.5	.....	3.77	7.700	13.860
290	W 20406	A	3	1.9	17.3	70.5	10.3	3.50	8.672	15.610
			2	.....	17.6	71.9	10.5	3.55	7.589	13.660
			3	.....	19.7	80.3	.....	3.97	7.733	13.920
291	12363	A	1	.82	20.40	67.86	10.92	1.08	8.639	15.550
			2	.....	20.57	68.42	11.01	3.11	7.680	13.734
			3	.....	23.11	76.89	.....	3.49	7.693	13.841
293	12079	A	3	3.47	20.49	67.30	8.74	1.09	8.644	13.759
			2	.....	21.23	69.72	9.05	1.13	7.918	14.252
			3	.....	23.34	76.66	.....	1.33	8.706	15.671
293	12080	A	3	4.19	19.70	67.64	8.47	1.07	7.554	13.597
			2	.....	20.56	70.60	8.84	1.12	7.884	14.191
			3	.....	22.55	77.45	.....	1.23	8.649	15.568
293	12082	A	3	3.86	19.79	67.54	8.81	1.08	7.565	13.617
			2	.....	20.58	70.26	9.16	1.23	7.868	14.162
			3	.....	22.65	77.35	.....	1.32	8.661	15.590
292	12074	A	1	4.15	20.01	66.83	9.01	3.77	7.552	13.547
			2	.....	20.88	69.72	9.40	3.83	8.667	15.601
			3	.....	23.06	76.95	.....	4.34	7.721	13.898
292	12075	A	1	3.24	19.58	69.21	7.97	3.41	7.980	14.364
			2	.....	20.24	71.52	8.24	3.52	8.697	15.654
			3	.....	22.06	77.94	.....	3.84	7.697	13.635
292	12081	A	3	3.19	21.88	67.24	7.69	3.06	7.746	13.945
			2	.....	22.60	69.46	7.94	3.16	8.692	15.646
			3	.....	24.55	75.45	.....	3.43	8.692	15.646
292	12081	A	3	3.61	20.86	67.07	8.46	3.38	4.92	77.06
			2	.....	21.64	69.58	8.78	3.51	4.69	79.95
			3	.....	23.72	76.28	.....	3.85	5.14	87.65
293	12090	A	3	3.04	19.42	67.38	10.16	1.00	1.90	3.0
			2	.....	20.03	69.49	10.48	1.15	7.753	14.341
			3	.....	22.38	77.62	.....	1.43	7.967	13.822
293	12072	A	3	.....	20.33	69.49	10.48	1.15	7.753	14.341
			2	.....	22.38	77.62	.....	1.43	7.967	13.822
			3	.....	24.55	75.45	.....	3.43	8.692	15.646
293	12090	A	3	3.61	20.86	67.07	8.46	3.38	4.92	77.06
			2	.....	21.64	69.58	8.78	3.51	4.69	79.95
			3	.....	23.72	76.28	.....	3.85	5.14	87.65
293	12072	A	3	3.04	19.42	67.38	10.16	1.00	1.90	3.0
			2	.....	20.03	69.49	10.48	1.15	7.753	14.341
			3	.....	22.38	77.62	.....	1.43	7.967	13.822
Morrisdale No. 2 mine, Middle Kittanning or C bed (face of heading 6, 4,500 feet from bottom of shaft No. 2, 4-foot 10-inch bed, 4-foot 9-inch cut).			3	.....	20.33	69.49	10.48	1.15	7.753	14.341
			2	.....	22.38	77.62	.....	1.43	7.967	13.822
			3	.....	24.55	75.45	.....	3.43	8.692	15.646
Morrisdale No. 1 mine, Lower Kittanning or B bed (face of main heading, 3,240 feet from bottom of shaft No. 1, 4-foot 4-inch bed, 3-foot 7 1/2-inch cut).			3	.....	20.33	69.49	10.48	1.15	7.753	14.341
			2	.....	22.38	77.62	.....	1.43	7.967	13.822
			3	.....	24.55	75.45	.....	3.43	8.692	15.646
Same (face of room 13, off right heading 8, off main heading, 5,040 feet from bottom of shaft No. 1, 4-foot 3 1/2-inch bed, 3-foot 9 1/2-inch cut).			3	.....	20.33	69.49	10.48	1.15	7.753	14.341
			2	.....	22.38	77.62	.....	1.43	7.967	13.822
			3	.....	24.55	75.45	.....	3.43	8.692	15.646
Same (face of room 45, off right entry 4, off main heading, 5,200 feet from bottom of shaft No. 1, 4-foot 1 1/2-inch bed, 3-foot 6 1/2-inch cut).			3	.....	20.33	69.49	10.48	1.15	7.753	14.341
			2	.....	22.38	77.62	.....	1.43	7.967	13.822
			3	.....	24.55	75.45	.....	3.43	8.692	15.646
Same (composite of samples 12074, 12075, and 12081)			3	.....	20.33	69.49	10.48	1.15	7.753	14.341
			2	.....	22.38	77.62	.....	1.43	7.967	13.822
			3	.....	24.55	75.45	.....	3.43	8.692	15.646
Morrisdale No. 2 mine, Middle Kittanning or C bed (face of heading 6, 4,500 feet from bottom of shaft No. 2, 4-foot 10-inch bed, 4-foot 9-inch cut).			3	.....	20.33	69.49	10.48	1.15	7.753	14.341
			2	.....	22.38	77.62	.....	1.43	7.967	13.822
			3	.....	24.55	75.45	.....	3.43	8.692	15.646

Table of chemical analyses—(Continued).

Locality, bed, etc.	Mine notes (page).	Sample.		Proximate.					Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PENNSYLVANIA—Continued.																
CLEARFIELD COUNTY—continued.																
Morrisdale; Morrisdale No. 2 mine, Middle Kittanning or C bed (room 9, left heading 2, off Lucky strike, 2,200 feet from bottom of shaft No. 2, 4-foot 1-inch bed, 4-foot cut).	283	12073	A	1 2 3	2.52	20.73 21.27 23.64	66.95 68.69 76.36	9.79 10.04	1.74 1.79 1.99					2.0	7.640 7.838 8.715	13.752 14.108 15.683
Same (composite of samples 12072 and 12073)	283	12091	A	1 2 3	2.83	20.30 20.89 23.28	66.91 68.86 76.72	9.95 10.25	1.32 1.36 1.52	4.67 4.49 5.00	77.05 79.29 88.34	1.25 1.29 1.44	5.75 3.32 3.70	2.2	7.580 7.801 8.692	13.644 14.042 15.646
Morrisdale No. 3 mine, Lower Kittanning or B bed (room 5, off left heading 1, off new slope tunnel, 1,400 feet from shaft No. 3, 4-foot 1½-inch bed, 3-foot 6-inch cut).	282	12076	A	1 2 3	3.23	19.68 20.34 22.01	69.75 72.07 77.99	7.34 7.59	1.99 2.06 2.23					2.6	7.805 8.067 8.729	14.051 14.321 15.712
Same (face of shaft No. 2 heading, off main dip, 5,500 feet from shaft, 3-foot 8-inch bed, 2-foot 1½-inch cut).	282	12077	A	1 2 3	3.34	19.23 19.90 21.30	71.07 73.52 78.70	6.36 6.58	1.71 1.77					2.8	7.897 8.170 8.745	14.215 14.706 15.741
Same (face of Morrisdale heading, 6,300 feet from shaft, 3-foot 10½-inch bed, 3-foot 2½-inch cut).	282	12078	A	1 2 3	3.24	19.78 20.44 22.02	70.02 72.37 77.98	6.96 7.19	2.03 2.10 2.26					2.7	7.862 8.125 8.755	14.152 14.623 15.759
Same (composite samples 12076, 12077, and 12078) ..	283	12092	A	1 2 3	3.30	20.82 20.82 22.45	69.57 71.94 77.55	7.00 7.24	1.91 1.98 2.13	4.66 4.44 4.79	79.93 82.66 80.12	1.36 1.41 1.52	5.14 2.27 2.44	2.7	8.062 8.180 8.765	14.152 14.694 15.777
Munson; Colorado No. 5 mine, Lower Kittanning or B bed (at face of left entry 6, off line heading, 4-foot 1-inch bed, 3-foot cut).	294	12109	A	1 2 3	3.74	19.77 20.54 22.10	69.68 72.39 77.90	6.81 7.07	1.66 1.72					2.7	7.835 8.140 8.759	14.103 14.652 15.766
Same (face of left entry 8, off main heading, 3,000 feet from drift mouth, 4-foot 2½-inch bed, 3-foot 2-inch cut).	294	12110	A	1 2 3	3.58	20.28 21.03 22.66	69.21 71.78 77.34	6.93 7.19	1.85 1.87 1.99					2.7	7.835 8.126 8.756	14.103 14.627 15.761
Same (face of main heading, 3,600 feet from drift mouth, 4-foot 4½-inch bed, 3-foot 2½-inch cut).	294	12111	A	1 2 3	3.31	20.02 20.70 22.40	69.34 71.72 77.60	7.33 7.58	1.64 1.70 1.84					2.4	7.817 8.084 8.747	14.071 14.551 15.745
Same (face of line heading, 4-foot 3½-inch bed, 3-foot 2-inch cut).	294	12112	A	1 2 3	3.27	19.91 20.58 22.57	68.31 70.62 77.43	8.51 8.80	2.02 2.05 3.31					2.5	7.688 7.948 8.715	13.838 14.306 15.687

Same (face of left heading 6, off main heading, 4-foot 10½-inch bed, 3-foot 9½-inch cut).	294	12113.	A	1	3.40	19.44	68.75	8.41	2.02					2.4	7.673	13.811
				2		20.12	71.17	8.71	2.09					7.943	14.297	
				3		22.04	77.96							8.701	15.662	
Same (composite of samples 12109-12113).	294	12114	A	1	3.27	19.91	69.02	7.80	2.02	4.54	78.95	1.32	5.07	7.789	14.023	
				2		20.53	71.36	8.06	2.09	4.63	81.62	1.36	2.24	8.052	14.494	
				3		22.38	77.02		2.27	5.04	88.78	1.48	2.43	8.758	15.764	
Osceola Mills, 3 miles west of; Fairmount No. 2 mine, Lower Freeport or D bed (face of room 5, off left heading 2, 5-foot 1-inch bed and cut).	294	W17010	A	1	3.1	21.0	69.7	6.2	1.55					7.861	14.150	
				2		21.5	72.1	6.4	1.60					8.117	14.610	
				3		23.0	77.0		1.71					8.672	15.610	
Same (face of room 14, off right heading 8, 5-foot 3½-inch bed and cut).	294	W17012	A	1	2.4	22.5	68.8	6.3	1.00					7.967	14.340	
				2		23.0	70.6	6.4	1.00					8.161	14.690	
				3		24.6	75.4		1.07					8.717	15.690	
Same (composite of samples W17010 and W17012)	295	11711	A	1	1.80			6.44	1.31	4.71	81.71	1.28	4.55			
				2				6.56	1.33	4.59	83.21	1.30	3.01			
				3				69.9	1.42	4.91	89.05	1.39	3.23			
Philipsburg, 2 miles west of; Guion mine, Lower Kittanning or B bed (face of right heading 1, off right entry 2, 4,000 feet from mine mouth, 3-foot 1½-inch bed and cut).	295	W20369	A	1	2.0	20.0	71.3	8.1	1.05					7.828	14.090	
				2		20.4	71.3	8.3	1.10					7.983	14.370	
				3		22.2	77.8		1.20					8.711	15.680	
Same (face of right heading 2, 4,000 feet from mine mouth, 3-foot 2-inch bed and cut).	295	W20370	A	1	2.0	21.5	69.2	7.3	1.00					7.906	14.230	
				2		21.9	70.7	7.4	1.05					8.067	14.520	
				3		23.7	76.3		1.13					8.711	15.680	
Same (back heading, off right entry 1, 2,500 feet from mine mouth, 3-foot 4-inch bed, 2-foot 8-inch cut).	295	W20371	A	1	2.9	18.4	69.1	9.6	2.15					7.600	13.680	
				2		18.9	71.2	9.9	2.20					7.828	14.090	
				3		21.0	79.0		2.44					8.683	15.630	
Same (50 feet from face of left heading 1, off right entry 2, 3-foot 3½-inch bed and cut).	295	W20372	A	1	2.0	19.2	70.1	8.7	1.53					7.789	14.020	
				2		19.6	71.5	8.9	1.60					7.950	14.310	
				3		21.5	78.5	10.5	1.76					8.728	15.710	
Same (face of left heading 1, off right entry 1, 2,200 feet from mine mouth, 3-foot 6½-inch bed, 3-foot 2½-inch cut).	295	W20373	A	1	2.4	19.6	67.5	10.5	1.85					7.539	13.570	
				2		20.1	69.1	10.8	1.90					7.728	13.910	
				3		22.5	77.5		2.13					8.667	15.600	
Same (composite of samples W20369-W20373).	295	12367	A	1	.90	21.59	68.49	9.02	1.69	4.57	79.49	1.31	3.62	7.811	14.060	
				2		21.79	69.11	9.10	2.01	4.51	80.21	1.32	2.85	7.882	14.188	
				3		23.97	76.03		2.21	4.96	88.24	1.45	3.14	8.671	15.008	
Smoke Run, 3½ miles southeast of; Viola mine, Miller or B bed (near face of left heading 9, beyond room 18, 1,300 feet from main haulage way, 5-foot 8-inch bed, 4-foot 10-inch cut).	296	11748	A	1	3.83	20.40	68.87	6.90	1.11				3.1	7.812	14.062	
				2		21.21	71.62	7.17	1.15					8.123	14.621	
				3		22.85	77.15		1.24					8.750	15.750	
Same (face of second slant to right just beyond room 3, 5-foot 2-inch bed, 4-foot 3-inch cut).	296	11749	A	1	3.67	20.36	68.87	7.10	.90				2.9	7.822	14.080	
				2		21.14	71.49	7.37	.93					8.120	14.016	
				3		22.82	77.18		1.00					8.766	15.779	
Same (face of main entry, 4,750 feet southwest of opening, 5-foot 4½-inch bed, 4-foot 4½-inch cut).	296	11750	A	1	3.67	20.30	67.64	8.39	1.18				2.9	7.706	13.871	
				2		21.07	70.22	8.71	1.22					8.000	14.400	
				3		23.08	76.92		1.34					7.763	15.773	
Same (composite of samples 11748, 11749, and 11750).	296	11751	A	1	3.73	20.09	68.41	7.57	1.33	4.89	78.92	1.22	6.10	7.761	13.970	
				2		21.08	71.06	7.86	1.38	4.62	81.97	1.27	2.90	8.061	14.510	
				3		22.88	77.12		1.50	5.01	88.96	1.38	3.15	7.849	15.748	
Same (near face of left entry 10; 100 feet from room 12; 5-foot 4½-inch bed, 4-foot 5½-inch cut).	296	W18355	A	1	3.0	19.6	70.3	7.1	.75					7.822	14.080	
				2		20.2	72.5	7.3						8.061	14.510	
				3		21.8	78.2		.81					8.694	15.650	

Same (face of third south or up-creek heading, 4-foot 6½-inch bed, 3 foot 7½-inch cut).	298	12122	A	1	1.98	13.38	79.26	5.38	.86	.....	.....	1.3	8.159	14.686
	2			2	.....	13.65	80.86	5.49	.88	.....	.....	.....	8.324	14.982
Same (face of second west tunnel 4-foot 9½-inch bed, 3-foot 11½-inch cut).	298	12123	A	3	1.85	14.44	85.56	5.92	.92	.....	.....	.....	8.808	15.854
	1			1	.....	14.14	78.09	5.92	.92	.....	.....	1.3	8.116	14.609
	2			2	.....	14.41	79.56	6.03	1.00	.....	.....	.....	8.269	14.884
	3			3	.....	15.34	84.66	6.03	1.06	.....	.....	.....	8.800	15.884
Same (No. 7 or Bolinger heading, 5-foot 10½-inch bed, 5-foot 1½-inch cut).	298	12124	A	1	2.43	15.31	75.48	6.78	1.79	.....	.....	1.7	7.989	14.240
	2			2	.....	15.69	77.36	6.95	1.83	.....	.....	.....	8.137	14.647
	3			3	.....	16.86	83.14	6.95	1.97	.....	.....	.....	8.745	15.711
Same (composite of samples 12121-12124).....	298	12125	A	1	2.18	14.07	77.62	6.13	1.14	4.46	83.33	3.64	7.085	14.553
	2			2	.....	14.38	79.35	6.27	1.17	4.31	85.19	1.73	8.065	14.877
	3			3	.....	15.34	84.66	6.27	1.25	4.60	90.89	1.84	8.18	15.872
INDIANA COUNTY.														
Clymer, 1½ miles north of: Empire M (McKean) mine; Lower Kittanning or B bed; corner of pillar of room 44, off right entry 1, off main entry, 3-foot 3½-inch cut).	299	W19682	A	1	2.2	26.4	64.6	6.8	1.95	.....	.....	.....	7.956	14.320
	2			2	.....	27.0	66.0	7.0	2.00	.....	.....	.....	8.133	14.640
	3			3	.....	29.0	71.0	.....	2.15	.....	.....	.....	8.744	15.740
Same (face of room 56, off right entry 2, off main entry, 4,000 feet east of mine mouth, 3-foot 2½-inch bed and cut).	299	W19678	A	1	1.9	26.5	64.0	7.6	2.40	.....	.....	.....	7.911	14.240
	2			2	.....	27.0	65.2	7.8	2.50	.....	.....	.....	8.061	14.510
	3			3	.....	29.3	70.7	.....	2.71	.....	.....	.....	8.744	15.740
Same (corner of crosscut at room 40, off right entry 2, off main entry, 3,000 feet southeast of mine mouth, 3-foot 2½-inch cut).	299	W19680	A	1	2.1	26.5	63.4	8.0	2.25	.....	.....	.....	7.811	14.060
	2			2	.....	27.1	64.7	8.2	2.30	.....	.....	.....	7.978	14.360
	3			3	.....	29.5	70.5	.....	2.51	.....	.....	.....	8.694	15.650
Same (face of first parallel, off south heading, off right entry 1, off main entry, 2,800 feet southwest of mine mouth, 3-foot 3½-inch cut).	299	W19685	A	1	2.8	26.4	64.4	6.4	1.65	.....	.....	.....	7.917	14.250
	2			2	.....	27.2	66.2	6.6	1.70	.....	.....	.....	8.150	14.670
	3			3	.....	29.1	70.9	.....	1.82	.....	.....	.....	8.728	15.710
Same (face of third parallel, off south heading, off right entry 1, off main entry, 3-foot 3½-inch cut).	299	W19687	A	1	2.5	26.9	63.9	6.7	1.70	.....	.....	.....	7.917	14.250
	2			2	.....	27.6	65.5	6.9	1.75	.....	.....	.....	8.122	14.620
	3			3	.....	29.6	70.4	.....	1.88	.....	.....	.....	8.722	15.700
Same (composite of samples W19678, W19680, W19685, and W19687).	299	12223	A	1	1.30	26.70	64.40	7.60	2.03	5.02	80.35	3.64	7.953	14.315
	2			2	.....	27.05	65.25	7.70	2.23	4.94	81.41	2.51	8.058	14.504
	3			3	.....	29.31	70.69	.....	2.26	5.35	88.20	1.50	8.730	15.714
1 mile north of: Empire R mine, Lower Kittanning or B bed (pillar at room 28, in left entry 2, off main entry, 2,200 feet east of mine mouth, 3-foot 2-inch bed and cut).	300	W19681	A	1	2.1	26.5	64.9	6.5	1.70	.....	.....	.....	7.972	14.350
	2			2	.....	27.1	66.3	6.6	1.75	.....	.....	.....	8.139	14.650
	3			3	.....	29.0	71.0	.....	1.87	.....	.....	.....	8.717	15.680
Same (crosscut at corner of room 47, off left entry 1, off main entry, 4,700 feet southeast of mine mouth, 3-foot 2½-inch bed, 3-foot 1½-inch cut).	300	W19679	A	1	2.3	26.6	63.3	7.8	2.70	.....	.....	.....	7.839	14.110
	2			2	.....	27.2	64.8	8.0	2.75	.....	.....	.....	8.022	14.440
	3			3	.....	29.6	70.4	.....	2.99	.....	.....	.....	8.722	15.700
Same (face of room 3, off right entry 1, off main entry, 1,100 feet south of mine mouth, 3-foot 10½-inch bed and cut).	300	W19683	A	1	2.0	26.6	64.4	7.0	1.90	.....	.....	.....	7.961	14.330
	2			2	.....	27.1	65.8	7.1	1.95	.....	.....	.....	8.122	14.620
	3			3	.....	29.2	70.8	.....	2.10	.....	.....	.....	8.750	5.750
Same (face of room 11, left entry 5, off main entry, 1,900 feet southeast of mine mouth, 3-foot 2½-inch bed and cut).	300	W19684	A	1	2.2	26.0	64.5	7.3	2.15	.....	.....	.....	7.850	14.130
	2			2	.....	26.6	65.9	7.5	2.28	.....	.....	.....	8.022	14.440
	3			3	.....	28.8	71.2	.....	2.38	.....	.....	.....	8.672	15.610
Same (near face of room 43, off left entry 4, off main entry, 3,100 feet from mine mouth, 3-foot 2½-inch bed and cut).	300	W19686	A	1	1.9	26.6	64.7	6.8	2.15	.....	.....	.....	7.972	14.350
	2			2	.....	27.1	66.0	6.9	2.20	.....	.....	.....	8.128	14.630
	3			3	.....	29.1	70.9	.....	2.36	.....	.....	.....	8.728	15.710
Same (composite of samples W19679, W19683, W19684, and W19686).	300	12219	A	1	1.23	26.37	64.84	7.56	2.41	4.99	79.89	1.37	7.943	14.297
	2			2	.....	26.70	65.65	7.65	2.44	4.91	80.89	1.39	8.042	14.476
	3			3	.....	28.91	71.09	.....	2.64	5.32	87.59	1.51	8.708	15.674

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.					Ultimate.				Air-drying loss.		Calorific value.	
		Laboratory No.	Kind.	Con-dition.	Mois-ture.	Vola-tile matter.	Fixed car-bon.	Ash.	Sul-phur.	Hy-dro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.		Calo-ries.	British thermal units.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
PENNYSYLVANIA—Continued.																	
INDIANA COUNTY—continued.																	
Glen Campbell, 2½ miles north of Huvershurst Junction; Indiana No. 6 mine, Upper Freeport or E bed (face of left heading 7, off main entry, 3,000 feet northwest of mine mouth, 4-foot 3½-inch bed, 3-foot 8½-inch cut).	301	12102	A	1	3.01	27.42	61.30	8.27	1.30					1.8	7,650	13,770	
				2		28.27	63.20	8.53	1.34					7,887	14,197		
				3		30.91	69.09		1.47					8,623	15,521		
Same (face of room 10 off left entry 1, off main heading, 1,000 feet northeast of mine mouth, 4-foot 10½-inch bed, 3-foot 10½-inch cut).	301	12103	A	1	2.89	26.89	61.69	8.53	1.20					1.7	7,622	13,720	
				2		27.69	63.53	8.78	1.23					7,849	14,128		
				3		30.36	69.64		1.35					8,606	15,491		
Same (rib near face of room 14, in right heading 7, off main entry, 2,000 feet northwest of mine mouth, 4-foot 11½-inch bed, 4-foot 14½-inch cut).	301	12104	A	1	3.66	26.95	61.24	8.15	1.19				2.5	7,611	13,700		
				2		27.97	63.57	8.46	1.24					7,900	14,220		
				3		30.55	69.45		1.35					8,630	15,534		
Same (face of left heading 6, off main entry, 2,200 feet southwest of mine mouth, 4-foot 8½-inch bed, 3-foot 11½-inch cut).	301	12105	A	1	2.88	27.93	60.25	8.94	1.75				1.7	7,610	13,698		
				2		28.76	62.03	9.21	1.93					7,836	14,105		
				3		31.68	68.32		1.93					8,631	15,536		
Same (near face of room 1, on right heading 8, off main entry, 2,300 feet northwest of mine mouth, 4-foot 10½-inch bed, 4-foot 8½-inch cut).	301	12106	A	1	3.23	27.44	61.05	8.28	1.26				1.9	7,609	13,696		
				2		28.36	63.08	8.56	1.30					7,863	14,153		
				3		31.01	68.99		1.42					8,599	15,478		
Same (composite of samples 12102-12106).	301	12107	A	1	3.08	27.32	61.16	8.44	1.29	4.99	76.71	1.27	7.30	1.9	7,651	13,772	
				2		28.19	63.10	8.71	1.33	4.80	79.15	1.31	4.70		7,894	14,209	
				3		30.88	69.12		1.46	5.26	86.70	1.43	5.15		8,647	15,565	
Homer City, 1 mile northwest of Tearing Run mine, E or Upper Freeport bed (No. 4 stump, on right entry 1, off main entry, 5-foot 2½-inch cut).	301	W20431	A	1	2.6	24.5	64.8	8.1	2.50						7,739	13,930	
				2		25.2	66.5	8.3	2.55						7,944	14,300	
				3		27.5	72.5		2.78						8,756	15,760	
Same (rib of room 10, off left entry 1, off main entry, 3-foot 7½-inch cut).	301	W20428	A	1	2.6	26.5	63.4	9.2	2.80						7,622	13,720	
				2		27.2	63.4	9.4	2.90						7,828	14,090	
				3		30.0	70.0		3.20						8,639	15,560	
Same (face of right entry 2, off main entry, 5-foot 1-inch cut).	301	W20429	A	1	2.8	23.8	64.1	9.3	2.65						7,550	13,590	
				2		24.5	65.9	9.6	2.75						7,767	13,980	
				3		27.1	72.9		3.04						8,589	15,460	

Same (rib near face of left entry 2, off main entry, 5-foot 14-inch cut).	301	W20430	A	1	2.3	24.6	64.6	8.5	2.20	.....	.....	.....	7,728	13,910
	2			2		25.2	66.1	8.7	2.25	.....	.....	.....	7,911	14,240
	3			3		27.6	72.4	.....	2.46	.....	.....	.....	8,667	15,600
Same ("shoo-fly" 100 feet below left entry 3, off main entry, 5-foot 33-inch cut).	301	W20432	A	1	2.0	24.4	65.2	8.4	2.15	.....	.....	.....	7,711	13,880
	2			2		24.9	66.5	8.6	2.20	.....	.....	.....	7,872	14,170
	3			3		27.2	72.8	.....	2.41	.....	.....	.....	8,611	15,500
Same (composite of samples 20428, 20429, 20430, and 20432).	301	12373	A	1	1.00	26.07	63.79	9.13	2.69	4.67	78.12	1.12	7,747	13,945
	2			2		26.33	64.44	9.23	2.72	4.61	78.91	1.13	7,825	14,085
	3			3		29.01	70.99	.....	3.00	5.08	86.94	1.24	8,621	15,518
JEFFERSON COUNTY.														
Sykesville, 1 mile south of: Sykesville mine, D or Lower Freeport bed (pillar at last cut-through between eighth left main and the back heading, off main south heading, 5-foot 10½-inch bed, 5-foot 9-inch cut).	302	12455	A	1	2.44	28.44	60.68	8.44	1.32	5.07	76.91	1.31	6,929	13,732
	2			2		29.15	62.20	8.65	1.35	4.92	78.83	1.34	7,820	14,076
	3			3		31.91	68.09	.....	1.48	5.39	86.30	1.47	8,561	15,410
Same (from cavity in roof between third right butt heading and second back heading in eighth main off main south heading, 6-foot 5-inch bed, 3-foot 7-inch cut).	303	12457	A	1	2.05	28.43	53.51	16.00	4.01	4.65	68.85	1.16	6,800	12,402
	2			2		29.03	54.64	16.33	4.09	4.51	70.29	1.18	7,034	12,661
	3			3		34.70	65.30	.....	4.89	5.39	84.01	1.41	8,407	15,133
Same (face of third right butt heading off eighth left, off main south heading, 5-foot 8½-inch bed, 5-foot 7-inch cut).	302	12458	A	1	2.53	29.50	60.48	7.49	1.31	5.07	78.06	1.38	7,684	13,831
	2			2		30.27	62.05	7.08	1.34	4.91	80.09	1.42	7,854	14,191
	3			3		32.79	67.21	.....	1.45	5.32	86.75	1.54	8,540	15,372
Same (cavity in roof of third right butt heading off eighth left main, about 200 feet from face of main heading, 2-foot 7½-inch cut).	303	12471	A	1	1.94	29.01	51.36	17.69	2.28	4.52	67.80	1.15	6,721	12,098
	2			2		29.58	52.38	18.04	2.33	4.39	69.14	1.17	6,854	12,337
	3			3		36.09	63.91	.....	2.84	5.36	84.36	1.43	8,363	15,053
LACKAWANNA COUNTY.														
Dunmore, 3 miles east of Seranton; Sloan mine, Dunmore No. 2 bed (7-foot cut).	303	11440	B	1	3.43	6.79	78.25	11.53	.46	2.52	78.85	.77	7,101	12,782
	2			2		7.03	81.03	11.94	.48	2.22	81.65	.80	7,353	13,235
	3			3		7.98	92.02	.....	.55	2.52	92.72	.91	8,350	15,030
LUZERNE COUNTY.														
Pittston, 2 miles southwest of: Colliery No. 14 mine, Pitston bed (working face of rear station 4095, on Bramman slope).	303	11441	B	1	2.19	5.67	86.24	5.90	.57	2.70	86.37	.91	7,682	13,828
	2			2		5.80	88.17	6.03	.58	2.52	88.30	.93	7,854	14,137
	3			3		6.17	93.83	.....	.62	2.68	93.97	.99	8,358	15,044
Wilkes-Barre, near: Dorrance mine, Red Ash bed (end of first west gateway, 600 feet northwest of shaft).	303	11782	B	1	1.31	5.68	85.87	7.14	.42	2.35	86.76	.68	7,654	13,777
	2			2		5.76	87.01	7.23	.43	2.23	87.91	.69	7,756	13,961
	3			3		6.21	93.79	.....	.46	2.40	94.76	.74	8,360	15,048
SOMERSET COUNTY.														
Acosta, ¼ mile north of: Belmont No. 1 mine, Upper Kittinging or C' bed (face of room 4 off main heading, 1,300 feet from mine mouth, 3-foot 6-inch bed, 3-foot 4½-inch cut).	304	W19536	A	1	2.0	16.1	72.8	9.1	1.35	.....	.....	.....	7,778	14,000
	2			2		16.4	74.3	9.3	1.40	.....	.....	.....	7,939	14,290
	3			3		18.1	81.9	.....	1.54	.....	.....	.....	8,736	15,760
Same (face of third left entry, 60 feet from main entry, 3-foot 5½-inch bed, 3-foot 4½-inch cut).	304	W19537	A	1	2.2	15.7	73.4	8.7	1.25	.....	.....	.....	7,811	14,060
	2			2		16.1	75.0	8.9	1.30	.....	.....	.....	7,983	14,370
	3			3		17.7	82.3	.....	1.43	.....	.....	.....	8,736	15,760
Same (face of room 3, off first right entry, 3-foot 9½-inch bed and cut).	304	W19538	A	1	2.0	15.5	72.7	9.8	1.40	.....	.....	.....	7,683	13,830
	2			2		15.8	74.2	10.0	1.45	.....	.....	.....	7,844	14,120
	3			3		17.6	82.4	.....	1.83	.....	.....	.....	8,711	15,080

Table of chemical analyses—(Continued).

Mine notes (page).	Locality, bed, etc.	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Con-dition.	Mois-ture.	Vola-tile mat-ter.	Fixed car-bon.	Ash.	Sul-phur.	Hy-dro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.	Air-dry-ing loss.	Calo-ries.	British thermal units.
2	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PENNSYLVANIA—Continued.																
SOMERSET COUNTY—continued.																
304	Acosta, $\frac{1}{2}$ mile north of; Belmont No. 1 mine, Upper Kittanning or C' bed (face of left entry 2; 250 feet from main entry; 3-foot 3½-inch bed and cut).	W19539	A	1	2.0	16.2	73.1	8.7	1.30						7,828	14,090
304	Same (face of main heading; 1,550 feet from mine mouth, 150 feet above left entry 3; 3-foot 2½-inch bed, 3-foot 1-inch cut).	W19543	A	2	1.4	16.4	73.7	8.5	1.03						7,767	13,780
304	Same (composite of samples W19536, W19537, W19538, W19539, and W19543).	12209	A	3	1.2	15.65	74.18	8.97	1.39	4.31	80.74	1.36	3.23		7,853	15,720
305	Berlin, $1\frac{1}{2}$ miles east of; Coronet No. 3 mine, "Smokeless" or Upper Freeport bed (pillar between rooms 2 and 3 off main air course, between right entries 3 and 4; 1,400 feet from mine mouth).	W19535	A	1	3.0	17.7	68.6	10.7	1.50	4.23	81.72	1.38	2.18		7,926	14,267
305	Same (face of left entry 8, 15 feet beyond room 15; 2,950 feet from mouth of main entry, 3-foot 9½-inch bed and cut).	W19532	A	2	2.3	18.5	66.4	12.8	1.80						7,406	13,330
305	Same (face of right entry 6; 125 feet from main heading, 2,500 feet from mouth of main entry; 3-foot 5½-inch bed, 3-foot 4½-inch cut).	W19533	A	1	2.3	21.7	78.3	10.9	1.35						8,728	15,710
305	Same (face of room 13, off left entry 7, 2,450 feet from mouth of main entry, 3-foot 6½-inch bed, 3-foot 5-inch cut).	W19534	A	2	2.4	18.0	68.3	11.3	1.90						7,739	13,930
305	Same (face of right entry 7, 50 feet beyond room 8; 2,800 feet from mouth of main entry, 3-foot 8-inch bed, 3-foot 4½-inch cut).	W19542	A	3	2.4	20.8	79.2	11.6	1.95						7,522	13,540
305	Same (composite of samples W19542, W19533, W19532, and W19534).	12214	A	2	1.44	18.56	68.44	11.3	1.95	4.39	77.31	1.64	3.22		7,706	13,870
306	Confluence, $\frac{1}{2}$ miles southeast of; Linmer mine, C' bed (at end of back subentry, off main entry 1, about 2,500 feet southeast of mine mouth, 3-foot 6½-inch bed and cut).	13631	B	1	2.8	21.33	78.67	8.20	2.16	4.86	88.86	1.88	2.24	2.2	7,115	13,887
				2	26.69	64.87	8.44	2.42	2.35						7,357	14,287
				3	29.15	70.85			2.64						8,069	15,064

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.		Proximate.				Ultimate.					Calorific value.			
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PENNSYLVANIA—Continued.																
SOMERSET COUNTY—continued.																
Pinehill, 2 miles southwest of Berlin; Consolidation No. 112 mine, Little Pittsburgh bed (room 44, off right subentry 8, off west main entry, about 3,600 feet southwest of mine mouth, 3-foot 7-inch bed and cut).	309	13981	B	1 2 3	2.21	21.48 21.97 24.20	67.29 68.81 75.80	9.02 9.22	2.29 2.34 2.58	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	1.3	7,658 7,831 8,627	13,784 14,096 15,529
	309	13982	B	1 2 3	3.09	21.58 22.27 23.96	68.51 70.69 76.04	6.82 7.04	1.04 1.07 1.15	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	1.9	7,767 8,015 8,622	13,981 14,427 15,520
	309	14037	B	1 2 3	2.58	21.53 22.10 24.06	67.97 69.77 75.94	7.92 8.13	1.66 1.70 1.85	4.69 4.52 4.92	78.88 80.97 88.14	1.72 1.77 1.93	5.13 2.91 3.16	1.6	7,724 7,929 8,631	13,903 14,272 15,536
2 miles southwest of Berlin; Consolidation No. 113 mine, "Stoner" bed (from mine car brought from room 2, off right entry 10, about 3,700 feet southwest of mine mouth).	309	13984	B	1 2 3	3.43	19.14 19.82 22.32	66.61 68.98 77.08	10.82 11.20	1.89 1.96 2.21	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	2.7	7,398 7,661 8,627	13,316 13,790 15,529
	310	W19627	A	1 2 3	2.2	15.8 16.2 17.6	74.2 75.8 82.4	7.8 8.0	.60 .60 .65	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	.....	7,850 8,028 8,728	14,130 14,450 15,710
	310	W19628	A	1 2 3	2.1	15.2 15.5 17.0	73.9 75.5 83.0	8.8 9.0	.80 .80 .88	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	.....	7,794 7,967 8,756	14,030 14,340 15,760
Same (face of room 4, off right entry 6, 2,800 feet from mine mouth, 3-foot 4½-inch cut).	310	W19629	A	1 2 3	1.9	16.4 16.7 18.2	73.7 75.1 81.8	8.0 8.2	.70 .70 .75	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	.....	8,011 8,792 9,850	14,420 15,790 17,130
	310	W19630	A	1 2 3	2.1	15.8 16.1 17.5	74.2 75.8 82.5	7.9 8.1	.75 .82 .85	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	.....	8,017 8,722 9,772	14,430 15,700 17,990
	210	W19631	A	1 2 3	2.0	15.5 15.6 17.3	73.2 74.7 82.7	9.5 9.7	.65 .65 .72	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	.....	7,933 8,783 9,883	14,280 15,783 17,180

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.				Ultimate.					Calorific value.					
		Laboratory No.	Kind.	Con-dition.	Mois-ture.	Vola-tile mat-ter.	Fixed car-bon.	Ash.	Sul-phur.	Hy-dro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.	Air-dry loss.	Calo-ries.	British thermal units.			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
PENNNSYLVANIA—Continued.																			
WASHINGTON COUNTY—continued.																			
Baird, near: Schoenberger mine, Pittsburgh bed (pillar, in right entry 29, off main entry, 5,500 feet south of mine mouth, 5-foot 2-inch bed, 5-foot $\frac{1}{2}$ -inch cut). Same (composite of samples 11164-11691).	312	11169	A	1	2.63	34.32	57.60	5.45	1.09					1.4					
				2		35.25	59.15	5.60	1.12										
				3		37.34	62.66		19.1										
				Same (composite of samples 11164-11691).															
Finleyville, 2 miles from: Cincinnati mine, Pittsburgh bed (butt entry 6, off face entry 14, 60 feet outby last cut-through, 6,200 feet northwest of Mingo slope mouth, 5-foot 8 $\frac{1}{2}$ -inch bed and cut). Same (butt entry 10, off face entry 14, 60 feet inby room 2, 6,800 feet northwest of Mingo slope mouth, 6-foot 1 $\frac{1}{2}$ -inch bed, 5-foot 5 $\frac{1}{2}$ -inch cut). Same (butt entry 12, off face entry 14, inby first crosscut, 7,400 feet northwest of Mingo slope mouth, 6-foot 3 $\frac{1}{2}$ -inch bed and cut). Same (composite of samples 17082, 17083, and 17084).	312	11170	A	1	3.94	33.55	56.81	5.70	1.04	5.33	77.21	1.37	9.35	7,676	13,817				
				2		34.93	59.14	5.93	1.08	5.09	80.38	1.43	6.09		7,991	14,384			
				3		37.13	62.87	6.74	1.15	5.41	85.44	1.52	6.48		8,494	15,290			
				313	17082	A	1	2.79	35.17	55.30	6.93	1.05					1.6	7,504	13,615
Finleyville, 2 miles from: Cincinnati mine, Pittsburgh bed (butt entry 6, off face entry 14, 60 feet outby last cut-through, 6,200 feet northwest of Mingo slope mouth, 5-foot 8 $\frac{1}{2}$ -inch bed and cut). Same (butt entry 10, off face entry 14, 60 feet inby room 2, 6,800 feet northwest of Mingo slope mouth, 6-foot 1 $\frac{1}{2}$ -inch bed, 5-foot 5 $\frac{1}{2}$ -inch cut). Same (butt entry 12, off face entry 14, inby first crosscut, 7,400 feet northwest of Mingo slope mouth, 6-foot 3 $\frac{1}{2}$ -inch bed and cut). Same (composite of samples 17082, 17083, and 17084).	313	17083	A	2		36.18	56.89	6.74	1.08					7,781	14,006				
				3		38.88	61.12		1.16						8,361	15,050			
				313	17083	A	1	3.22	35.10	55.76	5.92	1.13					2.1	7,592	13,666
				2		36.27	57.61	6.12	1.17								1.7	7,845	14,121
Monongahela City: Catsburg mine, Pittsburgh bed (face of butt entry 66, 2 $\frac{1}{2}$ miles northeast of mine mouth, 5-foot 6-inch bed, 5-foot 5-inch cut). Same (rib of room 17, off entry 75, 2 $\frac{1}{2}$ miles northeast of mine mouth, 4-foot 5 $\frac{1}{2}$ -inch bed, 4-foot 3 $\frac{1}{2}$ -inch cut). Same (face of room 23, off butt entry 79, 2 $\frac{1}{2}$ miles north of mine mouth, 5-foot 2 $\frac{1}{2}$ -inch bed, 5-foot 1 $\frac{1}{2}$ -inch cut).	313	17084	A	3	2.87	35.75	54.88	6.50	1.32					1.5	7,609	13,696			
				2		36.80	56.51	6.69	1.36								1.8	7,833	14,099
				3		39.44	60.56		1.46									8,365	15,111
				313	17085	A	1	3.03	35.22	55.36	6.39	1.19	5.52	77.05	1.41	8.44	1.8	7,586	13,655
Monongahela City: Catsburg mine, Pittsburgh bed (face of butt entry 66, 2 $\frac{1}{2}$ miles northeast of mine mouth, 5-foot 6-inch bed, 5-foot 5-inch cut). Same (rib of room 17, off entry 75, 2 $\frac{1}{2}$ miles northeast of mine mouth, 4-foot 5 $\frac{1}{2}$ -inch bed, 4-foot 3 $\frac{1}{2}$ -inch cut). Same (face of room 23, off butt entry 79, 2 $\frac{1}{2}$ miles north of mine mouth, 5-foot 2 $\frac{1}{2}$ -inch bed, 5-foot 1 $\frac{1}{2}$ -inch cut).	313	17085	A	2		36.32	57.09	6.59	1.23	5.34	79.45	1.45	5.94		7,823	14,081			
				3		38.88	61.12		1.32	5.72	85.05	1.55	6.36			1.7	8,375	15,075	
				314	11157	A	2	2.78	33.58	57.15	6.49	1.06							
				3		34.54	58.78	6.68	1.17										
Monongahela City: Catsburg mine, Pittsburgh bed (face of butt entry 66, 2 $\frac{1}{2}$ miles northeast of mine mouth, 5-foot 6-inch bed, 5-foot 5-inch cut). Same (rib of room 17, off entry 75, 2 $\frac{1}{2}$ miles northeast of mine mouth, 4-foot 5 $\frac{1}{2}$ -inch bed, 4-foot 3 $\frac{1}{2}$ -inch cut). Same (face of room 23, off butt entry 79, 2 $\frac{1}{2}$ miles north of mine mouth, 5-foot 2 $\frac{1}{2}$ -inch bed, 5-foot 1 $\frac{1}{2}$ -inch cut).	314	11158	A	3		37.01	62.99		1.17					1.6					
				2		33.44	58.07	5.81	.82										
				1		34.36	59.67	5.97	.84										
				314	11159	A	2	2.68	33.44	58.07	5.81	.82							
Monongahela City: Catsburg mine, Pittsburgh bed (face of butt entry 66, 2 $\frac{1}{2}$ miles northeast of mine mouth, 5-foot 6-inch bed, 5-foot 5-inch cut). Same (rib of room 17, off entry 75, 2 $\frac{1}{2}$ miles northeast of mine mouth, 4-foot 5 $\frac{1}{2}$ -inch bed, 4-foot 3 $\frac{1}{2}$ -inch cut). Same (face of room 23, off butt entry 79, 2 $\frac{1}{2}$ miles north of mine mouth, 5-foot 2 $\frac{1}{2}$ -inch bed, 5-foot 1 $\frac{1}{2}$ -inch cut).	314	11159	A	3		36.54	63.46		.89										
				2		33.27	57.79	5.84	1.02										
				1		34.33	59.64	6.03	1.05										
				314	11159	A	3	3.10	33.27	57.79	5.84	1.02						1.9	
Monongahela City: Catsburg mine, Pittsburgh bed (face of butt entry 66, 2 $\frac{1}{2}$ miles northeast of mine mouth, 5-foot 6-inch bed, 5-foot 5-inch cut). Same (rib of room 17, off entry 75, 2 $\frac{1}{2}$ miles northeast of mine mouth, 4-foot 5 $\frac{1}{2}$ -inch bed, 4-foot 3 $\frac{1}{2}$ -inch cut). Same (face of room 23, off butt entry 79, 2 $\frac{1}{2}$ miles north of mine mouth, 5-foot 2 $\frac{1}{2}$ -inch bed, 5-foot 1 $\frac{1}{2}$ -inch cut).	314	11159	A	3		36.53	63.47		1.12										
				2		33.27	57.79	5.84	1.02										
				1		34.33	59.64	6.03	1.05										
				314	11159	A	3	3.10	33.27	57.79	5.84	1.02						1.9	

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.				Ultimate.					Calorific value.				
		Laboratory No.	Kind.	Con-dition.	Mois-ture.	Vola-tile mat-ter.	Fixed car-bon.	Ash.	Sul-phur.	Hy-dro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.	Air-dry-ing loss.	Calo-ries.	British thermal units.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
SOUTH DAKOTA.																		
HARDING COUNTY.																		
Buffalo, 13 miles east of; sec. 1, T. 17 N., R. 7 E., open pit (face of pit, 6-foot 7-inch bed, 6-foot 1½-inch cut).	316	*13220	B	1	41.49	24.00	24.35	10.16	0.55					34.7	3,140	5,652		
				2		41.02	41.62	17.36	.94								5,367	9,661
				3		49.64	50.36		1.14									
10 miles north of, sec. 6, T. 20 N., R. 5 E., Hilton mine (face of entry, 120 feet from outcrop at mouth of entry).	316	*13221	B	1	39.80	25.31	23.81	11.08	1.06				33.0	3,046	5,483			
				2		42.04	39.56	18.40	1.59								3,060	9,108
				3		51.52	48.48		1.95									
18 miles east of; sec. 1, T. 17 N., R. 7 E., open pit (face of pit, 11-foot 5-inch bed, 6-foot 3-inch cut).	316	*13222	B	1	41.09	25.84	23.95	9.12	1.14				34.3	2,953	5,315			
				2		43.86	40.66	15.48	1.94								5,013	9,023
				3		51.90	48.10		2.30									
Ralph, 5 miles southeast of; sec. 10, T. 20 N., R. 9 E.; Newcomb mine, Widow Clark bed (fresh face of open pit, 10-foot 10-inch bed, 10-foot 1-inch cut).	317	*15062	B	1	34.75	27.19	28.96	9.10	.95				26.6	3,474	6,253			
				2		41.67	44.38	13.95	1.46								5,324	9,583
				3		48.42	51.58		1.70									
PERKINS COUNTY.																		
Lodgepole, 3 miles southwest of; sec. 29, T. 21 N., R. 12 E.; Nelson mine, (in entry 140 feet northwest of entry mouth, 7-foot cut).	317	*14354	B	1	33.30	28.95	27.26	10.49	.76					21.2	3,864	6,955		
				2		43.40	40.87	15.73	1.14								5,793	10,427
				3		51.50	48.50		1.35									
Strood, 6 miles northwest of; sec. 35, T. 19 N., R. 10 E.; Jones mine (end of main entry, 5-foot 4½-inch bed, 4-foot 2-inch cut).	318	*12453	B	1	39.16	24.68	27.81	8.35	2.22	6.60	38.02	.53	26.0	3,504	6,307			
				2		40.57	45.71	13.72	3.65	3.70	62.49	.87				15.57	5,760	10,368
				3		47.02	52.98		4.23	4.29	72.43	1.01							18.04	6,676	12,017
5 miles southwest of; sec. 2, T. 17 N., R. 10 E.; Knudsen mine (end of second entry, 3-foot 6-inch bed, 2-foot 7-inch cut).	318	*12454	B	1	34.69	26.42	27.64	11.25	1.08				19.6					
				2		40.45	42.32	17.28	1.65									
				3		48.87	51.13		1.99									
5 miles south of; sec. 17, T. 17 N., R. 11 W.; Phillips mine (in mine, 150 feet from mine mouth, 2-foot 5-inch bed).	318	*12488	B	1	42.46	23.24	25.30	9.00	1.16	7.07	35.22	0.62	46.93	30.1	3,308	5,954		
				2		40.39	43.97	15.64	2.02	4.08	61.21	1.08	15.97				5,749	10,348
				3		47.88	52.12		2.39	4.84	72.56	1.28	18.93						6,815	12,257

TENNESSEE.																
ANDERSON COUNTY.																
Brieville, $\frac{1}{2}$ mile west of; Cross Mountain No. 1 mine, Coal Creek bed (on right rib of left entry 26, outby last break-through to the right, 3-foot 8-inch bed, 3-foot 7-inch cut).	319	13237	A	1	1.55	35.36	56.49	6.60	.75	5.08	78.39	1.83	7.35	0.5	7.804	14.047
	2			2		35.92	57.38	6.70	.76	4.99	79.62	1.86	6.07		7.927	14.269
	3			3		38.50	61.50		.81	5.35	85.34	1.99	6.51		8.496	15.293
Same, chain pillar on right entry 27 (18 feet outby twelfth and last break-through, 3-foot 10-inch bed and cut).	319	13264	A	1	1.70	35.63	54.05	10.32	1.06	4.97	75.32	1.83	6.71	.5	7.679	13.462
	2			2		35.63	54.05	10.32	1.08	4.86	76.62	1.83	5.29		7.608	13.694
	3			3		39.73	60.27		1.20	5.42	85.44	2.04	5.90		8.584	15.277
Same (room 2 off left entry 26).....	319	13265	A	1	1.47	35.93	53.39	9.21	1.03	5.13	75.03	1.84	7.76	.5	7.564	13.615
	2			2		36.47	54.18	9.35	1.05	5.04	76.15	1.87	6.54		7.677	13.819
	3			3		40.23	59.77		1.16	5.56	84.00	2.06	7.22		8.408	15.242
Same (right rib of right entry 27, about 30 feet from main entry, 4-foot bed and cut).	319	13290	A	1	1.88	34.96	54.58	8.58	.78	5.15	76.79	1.81	6.89	.5	7.654	13.772
	2			2		35.63	55.63	8.74	.79	5.03	78.26	1.84	5.34		7.801	14.042
	3			3		39.04	60.96		.87	5.51	85.76	2.02	5.84		8.548	15.386
BLED SOE COUNTY.																
Herbert, near; prospect, Sewanee (?) bed (in drift near mouth, 6-foot 4-inch cut).	320	10915	B	1	3.44	31.10	57.63	7.83	.56					1.9	7.485	13.473
	2			2		32.21	59.69	8.10	.58						7.751	13.952
	3			3		35.05	64.95		.63						8.434	15.181
near; prospect, Sewanee (?) bed (face of new opening, 10 feet in, 3-foot cut).	320	10916	B	1	5.32	28.81	59.62	6.25	.51					3.7	7.447	13.405
	2			2		30.43	62.97	6.60	.54						7.866	14.189
	3			3		32.58	67.42		.58						8.421	15.158
Litton, 2 miles northwest of, 15 miles northeast of Pikeville; A. L. Hale mine, Angel bed (3-foot bed and cut).	320	12584	B	1	3.33	27.89	63.17	5.61	1.84					2.2	7.850	14.130
	2			2		28.85	65.35	5.80	1.94						8.120	14.616
	3			3		30.63	69.37		2.06						8.620	15.516
4 miles north of; prospect (in main entry, 60 feet from entry mouth).	320	10863	B	1	5.04	25.48	61.81	7.67	.62					3.9	7.493	13.487
	2			2		26.83	65.69	8.08	.67						7.891	14.204
	3			3		29.19	70.81		.67						8.585	15.453
Pikeville; 6 miles southwest of, J. W. McFarland prospect, Morgan Springs bed (in drift entry, 50 feet from outcrop, 21 $\frac{1}{2}$ -inch bed).	320	10731	B	1	2.17	33.80	53.40	10.63	3.53					1.0	7.361	13.250
	2			2		34.55	54.58	10.87	3.61						7.524	13.543
	3			3		38.77	61.23		4.05						8.442	15.196
About 10 miles west of; Vaughn Bros. prospect; Sewanee (?) bed (outcrop, 3-foot 9-inch bed).	321	11049	B	1	4.41	27.16	59.85	8.58	.93					2.8	7.302	13.144
	2			2		28.41	62.61	8.98	.97						7.639	13.750
	3			3		31.21	68.79		1.07						8.393	15.107
About 10 miles west of; Vaughn Bros. prospect; Sewanee (?) bed (outcrop, 3-foot 2-inch bed).	321	11050	B	1	4.38	26.66	62.37	6.59	.68					2.6	7.431	13.376
	2			2		27.88	65.23	6.89	.71						7.771	13.988
	3			3		29.94	70.06		.76						8.346	15.023
CUMBERLAND COUNTY.																
Litton, 4 miles north of; J. H. Hale & Son prospect, Sewanee (?) bed (in entry, 30 feet from entry mouth).	321	10800	B	1	4.30	25.71	62.51	7.48	.56					3.3	7.573	13.631
	2			2		26.86	65.33	7.81	.59						7.913	14.243
	3			3		29.14	70.86		.64						8.583	15.449
4 miles north of; J. H. Hale & Son prospect, Morgan Springs bed (in opening, 3-foot 6-inch bed).	321	10802	B	1	6.05	27.54	55.65	10.55	3.11					5.0	7.071	12.728
	2			2		29.59	59.23		3.31						7.526	13.547
	3			3		33.28	66.72		3.73						8.478	15.200

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.				Ultimate.				Air-drying loss.	Calorific value.		
		Laboratory No.	Kind.	Con-dition.	Mois-ture.	Volat-ile mat-ter.	Ash.	Sul-phur.	Hy-dro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.		Calo-ries.	British thermal units.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
UTAH—Continued.																
EMERY COUNTY.																
Emery, 4 miles south of; NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 33, T. 22 S., R. 6 E.; Browning mine, 1 bed (back of entry, 165 feet northeast of mouth, 22-foot bed, 12-foot cut.)	326	12627	B	1 2 3	3.93 40.92 42.59 45.39	49.22 51.24 51.24 54.61	5.93 5.93 6.17	.39 .41 .44	5.52 5.29 5.64	73.02 76.01 81.01	1.25 1.30 1.39	13.89 10.82 11.52	0.3	7,203 7,498 7,991	12,965 13,496 14,384	
4 miles southeast of; SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 26, T. 22 S., R. 6 E.; Casper mine, C bed, back end of main entry, 200 feet northwest of entry mouth, 9-foot 10-inch bed, 7-foot 3 $\frac{1}{2}$ -inch cut.)	327	12652	B	1 2 3	5.21 39.06 41.21 48.43	41.61 43.89 14.90 51.57	14.12	.81 1.00	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	1.8	6,263 6,607 7,764	11,273 11,893 13,975	
12 miles south of; SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 32, T. 23 S., R. 6 E.; surface prospect, 1 bed (cave in rock ledge, 12-foot 3-inch bed, 10-foot 5-inch cut.)	327	* 14903	B	1 2 3	16.67 44.15 41.93 55.02	34.29 50.33 48.52	7.10 8.52 1.46	1.12 1.34 1.46 4.66	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	8.5	5,277 6,332 6,922	9,499 11,398 12,460	
2 $\frac{1}{2}$ miles east of; SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 12, T. 22 S., R. 6 E.; Williams mine, 1 bed (back of main entry, 200 feet southeast of mine mouth).	328	12613	B	1 2 3	3.95 43.55 44.35 49.55	42.60 43.45 12.10 50.45	11.62 12.10	4.85 5.52 ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	6,661 6,935 7,890	11,990 12,483 14,202	
SEVIER COUNTY.																
Emery, 15 miles south of; SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 25, T. 24 S., R. 5 E.; surface prospect, A bed (near outcrop at prospect, 11-foot 3-inch bed, 11-foot cut.)	328	* 15061	B	1 2 3	18.41 33.86 41.50 51.67	42.16 51.07 55.46	5.57 6.83	.41 .50 ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	11.6	5,270 6,459 6,932	9,486 11,626 12,478	
Fremont, 15 miles northeast of; SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 3, T. 26 S., R. 4 E.; Hogan prospect, A bed (back end of drift, about 20 feet northwest of mouth, 5-foot 1-inch bed, 3-foot cut.)	328	* 15090	B	1 2 3	23.57 32.61 33.25 42.67	33.35 33.25 10.57 50.48	10.57 13.83	2.88 3.77 4.38 .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	17.0	4,346 5,686 6,599	7,823 10,235 11,878	
Salina, about 15 miles east of; sec. 7, T. 22 S., R. 3 E.; SW. $\frac{1}{4}$ SW. $\frac{1}{4}$; Kearns & Duggins mine, Duggins bed (in room of main entry, about 175 feet north of entry mouth, 3-foot 9-inch bed, 3-foot 7-inch cut.)	329	15045	B	1 2 3	6.38 45.10 48.17 55.41	36.28 38.76 44.59	12.24 13.07	.44 .47 .54 .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	3.1	6,529 6,974 8,022	11,752 12,553 14,440	

SUMMIT COUNTY.

Coatville, 6 miles northeast of SW $\frac{1}{4}$ sec. 24, T. 3 N., R. 5 E.; Rees-Grass Creek, 1 mile northeast of (in mine, 400 feet below surface, and 500 feet east of main slope, 8-foot 6-inch bed and cut).
1 mile southeast of; sec. 15, T. 2 N., R. 5 E.; Superior mine, Wasatch bed (in mine, 1,000 feet north, west of foot of slope, 7-foot 6-inch bed and cut).
3 miles northeast of SW $\frac{1}{4}$ sec. 3, T. 2 N., R. 5 E.; Wasatch mine, Wasatch bed (800-foot level, 3,000 feet northeast of main slope, 10-foot 6-inch bed and cut).

UINTA COUNTY.

Vernal, 7 miles north of; sec. 8, T. 3 S., R. 22 E.: Blue Bell mine (face of main entry, about 225 feet from mine mouth), 7-foot 8 $\frac{1}{2}$ -inch bed, 6-foot 5 $\frac{1}{2}$ -inch cut)
8 miles east of; Green mine (face of main entry, 75 feet from mine mouth, 4-foot 8 $\frac{1}{2}$ -inch bed, 2-foot 6-inch cut).
About 20 miles west of; Reynolds mine, Mancos bed (at face of main entry about 210 feet from surface).

WASATCH COUNTY.

Hanna, about 15 miles southwest of; sec. 26, T. 1 S., R. 9 W.; prospect (face of entry, 100 feet from mouth of entry, 24-foot 8-inch cut).
About 3 miles east of; sec. 7, T. 1 S., R. 7 W.; Winchester prospect, Mancos bed (in entry, about 10 feet from entry mouth).
Heber, about 25 miles southeast of; sec. 31, T. 1 S., R. 10 E.; Cummings mine (surface exposure, 13-foot bed, 10-foot 6-inch cut).

VIRGINIA.

DICKENSON COUNTY.

Clintwood, 3 miles southeast of: Elbert Powers mine, Clintwood (?) bed (in main entry, 20 feet from mine mouth, 7-foot 10½-inch bed, 4-foot 8-inch cut).

Near, 20 miles north of Coeburn: Yeates mine, Clintwood bed (at end of right entry 1, off main entry, 100 feet from main entry, 4-foot 2½-inch bed and cut).

Table of chemical analyses—Continued.

Mine notes (page).	Locality, bed, etc.	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
2	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
VIRGINIA—Continued.																
HENRICO COUNTY.																
333	Gayton, 1 mile from, 5 miles north of Lorraine: Carbon Hill mine, C bed (in main gateway, opposite room 45, 3-foot 6-inch bed, 3-foot 4-inch cut).	15050	A	1	2.81	25.70	62.47	9.02	1.43	4.90	76.55	1.81	6.29	1.9	7,496	13,493
333	Same (in main gateway opposite room 32, 3-foot 3-inch bed, 2-foot 3-inch cut).	15052	A	2	2.54	26.44	64.28	9.28	1.47	4.72	78.76	1.86	3.91	.....	7,713	13,883
333	1 mile from, 5 miles north of Lorraine: Carbon Hill mine, B bed (face of right gateway off slope 3, 20 feet beyond room 21, 4-foot 11-inch bed, 4-foot 9-inch cut).	15051	A	1	2.11	23.58	56.95	17.36	2.16	4.44	69.22	1.59	5.23	1.4	6,778	12,200
334	Dante, 2 miles north of; No. 2 mine, Upper Banner bed (face of butt heading off fourth left drift off McClure entry, 5-foot 2½-inch bed, 5-foot 1-inch cut).	10734	A	1	2.34	35.23	56.16	6.27	.59	.....	.....	.....	.....	1.5	7,832	14,098
334	Same (room 16, off right heading 3, off first drift off McClure entry, 5-foot 1½-inch bed, 4-foot 9½-inch cut).	10735	A	2	2.99	36.08	57.50	6.42	.60	.....	.....	.....	.....	.....	8,020	14,436
334	Same (composite of samples 10734 and 10735).	10736	A	3	2.76	38.56	61.44	.....	.64	.....	.....	.....	.....	.....	8,570	15,426
334	2 miles north of; No. 5 mine, Upper Banner bed (room 14, on right heading 5, off ninth drift, 5-foot 2½-inch bed, 5-foot 4-inch cut).	10737	A	1	2.29	35.16	56.66	5.19	.59	.....	.....	.....	.....	2.1	7,800	14,148
334	Same (butt on left heading 9, off ninth drift, 5-foot 3½-inch bed, 5-foot 3-inch cut).	10738	A	2	2.11	37.84	62.16	5.85	.56	5.32	80.13	1.43	6.76	1.8	8,560	15,408
334	Same (composite of samples 10737 and 10738).	10739	A	3	2.57	35.11	57.13	5.65	.56	5.15	82.41	1.47	4.43	.....	7,800	14,148
334	Same (composite of samples 10737 and 10738).	10739	A	3	2.57	35.87	58.36	5.77	.58	5.47	87.60	1.56	4.72	1.4	8,083	15,469
334	Same (composite of samples 10737 and 10738).	10739	A	3	2.57	36.00	59.15	4.85	.56	.....	.....	.....	.....	.....	8,591	15,464
334	Same (composite of samples 10737 and 10738).	10739	A	3	2.57	37.84	62.16	5.85	.56	.....	.....	.....	.....	.....	8,017	14,431
334	Same (composite of samples 10737 and 10738).	10739	A	3	2.57	35.11	57.13	5.65	.56	.....	.....	.....	.....	.....	8,205	14,789
334	Same (composite of samples 10737 and 10738).	10739	A	3	2.57	35.87	58.36	5.77	.58	.....	.....	.....	.....	.....	8,623	15,521
334	Same (composite of samples 10737 and 10738).	10739	A	3	2.57	38.06	61.94	.....	.62	.....	.....	.....	.....	.....	7,931	11,276
334	Same (composite of samples 10737 and 10738).	10739	A	3	2.57	38.00	56.70	5.33	.57	5.15	80.24	1.43	6.98	1.3	8,102	14,584
334	Same (composite of samples 10737 and 10738).	10739	A	3	2.57	36.06	57.90	5.44	.58	5.33	81.93	1.46	5.26	.....	8,398	15,176
334	Same (composite of samples 10737 and 10738).	10739	A	3	2.57	38.77	61.23	.....	.61	5.64	86.64	1.54	5.57	.....	8,600	15,480

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WASHINGTON—Continued.																
PIERCE COUNTY—continued.																
Wilkeson; Gale Creek mine, Queen bed (from 4 cars, washed).	343	W32147	C	1	2.7	34.2	52.4	10.7	.85						7,389	13,300
				2	.....	35.1	53.9	11.0	.90						7,594	13,670
				3	.....	39.4	60.6		1.01						8,533	15,360
Same (from 4 cars, washed)	343	W32158	C	1	3.6	33.3	51.2	11.9	.90						7,239	13,030
				2	.....	34.5	53.2	12.3	.95						7,506	13,510
				3	.....	39.3	60.7		1.08						8,561	15,410
Same (from same cars as No. W32158)	343	W32159	C	1	3.6	33.7	51.1	11.6	.90						7,250	13,050
				2	.....	35.0	53.0	12.0	.95						7,322	13,540
				3	.....	39.8	60.2		1.08						8,530	15,390
Same (from 4 cars, washed)	343	W32160	C	1	3.5	34.6	50.9	11.0	.95						7,317	13,170
				2	.....	35.9	52.7	11.4	1.00						7,583	13,650
				3	.....	40.5	59.5		1.13						8,561	15,410
Same (from same cars as No. W32160)	343	W32161	C	1	3.5	34.7	50.8	11.0	.85						7,328	13,190
				2	.....	36.0	52.6	11.4	.96						7,594	13,670
				3	.....	40.6	59.4		1.07						8,572	15,430
Same (from 4 cars, washed)	343	W32211	C	1	3.7	34.2	51.2	10.9	.90						7,311	13,160
				2	.....	35.5	53.2	11.3	.95						7,594	13,670
				3	.....	40.0	60.0		1.07						8,561	15,410
Same (from same cars as No. W32211)	343	W32212	C	1	3.4	34.7	51.3	10.6	.85						7,322	13,180
				2	.....	35.9	53.1	11.0	.90						7,583	13,650
				3	.....	40.3	59.7		1.01						8,522	15,340
Same (from 3 cars, washed)	343	W32213	C	1	3.0	34.7	51.7	10.6	.90						7,344	13,220
				2	.....	35.8	53.3	10.9	.95						7,572	13,630
				3	.....	40.2	59.8		1.07						8,500	15,300
Same (from same cars as No. W32213)	343	W32214	C	1	3.0	34.6	51.9	10.5	.85						7,383	13,290
				2	.....	35.7	53.5	10.8	.90						7,611	13,700
				3	.....	40.0	60.0		1.01						8,533	15,360
WEST VIRGINIA.																
BRAXTON COUNTY.																
Braxton; Braxton mine, Pittsburg bed (in room, about 325 feet southeast of mine mouth, 5-foot 3-inch bed and cut).	344	13556	B	1	2.83	40.90	47.59	8.68	3.40					1.2	7,382	13,288
				2	.....	42.09	48.98	8.93	3.50						7,597	13,675
				3	.....	46.22	53.78		3.84						8,342	15,016

BROOKE COUNTY.																
Colliers, 1 mile west of Lewis-Finley No. 1 mine, Pitts- burgh bed (room 1, off butt entry 6, off main entry, 4-foot 7½-inch bed, 3-foot 6-inch cut).	345	15671	B	1	4.58	35.36	54.05	6.01	1.28	5.28	73.81	1.55	12.07	2.6	7,352	13,234
	2			2	.....	37.05	56.64	6.30	1.34	5.00	77.35	1.62	8.39	.....	7,705	13,869
	3			3	.....	39.55	60.45	.....	1.43	5.34	82.55	1.73	8.95	.....	8,223	14,801
Same (room 7, off entry 10, side No. 2, 5,800 feet northwest of mine mouth, 4-foot 8-inch bed, 4-foot ½-inch cut).	345	15672	B	1	4.13	36.62	53.26	5.99	2.07	.....	.....	.....	.....	1.5	7,446	13,403
	2			2	.....	38.20	55.55	6.25	2.16	.....	.....	.....	.....	.....	7,767	13,981
	3			3	.....	40.75	59.25	.....	2.30	.....	.....	.....	.....	.....	8,285	14,913
FAYETTE COUNTY.																
Caperton; Sewell mine, Sewell bed (room turned off at face of drainage entry of Sugar Camp No. 3 workings, 4-foot bed and cut).	345	14344	A	1	3.99	24.29	68.78	2.94	.56	.....	.....	.....	.....	3.0	8,050	14,490
	2			2	.....	25.30	71.64	3.06	.58	.....	.....	.....	.....	.....	8,385	15,093
	3			3	.....	26.10	73.90	.....	.60	.....	.....	.....	.....	.....	8,650	15,570
Same (at last break-through in third right air course of Sugar Camp No. 1 workings, 2-foot 9-inch bed, 2-foot 5-inch cut).	345	14345	A	1	4.70	23.81	69.63	1.86	.50	.....	.....	.....	.....	3.7	8,114	14,605
	2			2	.....	24.98	73.07	1.95	.52	.....	.....	.....	.....	.....	8,514	15,325
	3			3	.....	25.48	74.52	.....	.53	.....	.....	.....	.....	.....	8,683	15,629
Same (face of right entry 13, Old Hill workings, 5,000 feet northeast of mine mouth, 4-foot 2½-inch bed, 4-foot cut).	345	14346	A	1	3.28	24.37	70.44	1.91	.53	.....	.....	.....	.....	2.2	8,218	14,792
	2			2	.....	25.20	72.83	1.97	.55	.....	.....	.....	.....	.....	8,497	15,295
	3			3	.....	25.71	74.29	.....	.56	.....	.....	.....	.....	.....	8,668	15,602
Same (composite of samples 14344, 14345, and 14346).	346	14347	A	1	3.97	23.84	69.97	2.22	.56	5.08	83.37	1.62	7.15	3.0	8,116	14,609
	2			2	.....	24.82	72.87	2.31	.58	4.83	86.81	1.69	3.78	.....	8,451	15,212
	3			3	.....	25.41	74.59	.....	.59	4.94	88.80	1.73	3.88	2.5	8,650	15,570
Same (pillar at last room off cross entry 11, Old Hill workings, 3-foot 8½-inch bed and cut).	345	14348	A	1	3.49	23.75	70.09	2.67	.57	.....	.....	.....	.....	.....	8,137	14,647
	2			2	.....	24.61	72.62	2.77	.59	.....	.....	.....	.....	.....	8,432	15,178
	3			3	.....	25.31	74.69	.....	.61	.....	.....	.....	.....	.....	8,672	15,610
Same (on pillar of right entry 2, Sugar Camp No. 2 workings, 4-foot 1-inch bed, 3-foot 11-inch cut).	345	14349	A	1	2.89	25.47	69.28	2.36	.53	.....	.....	.....	.....	2.0	8,235	14,823
	2			2	.....	26.23	71.34	2.43	.55	.....	.....	.....	.....	.....	8,480	15,264
	3			3	.....	26.88	73.12	.....	.56	.....	.....	.....	.....	.....	8,691	15,644
Same (composite of samples 14348 and 14349).....	346	14350	A	1	3.22	24.54	69.70	2.54	.55	5.16	83.80	1.67	6.28	2.3	8,170	14,706
	2			2	.....	25.36	72.02	2.62	.57	4.96	86.59	1.73	3.53	.....	8,442	15,196
	3			3	.....	26.04	73.96	.....	.59	5.09	88.92	1.78	3.62	.....	8,669	15,604
Dunlop; Dunn Loop No. 2 mine, Sewell bed (at last break-through to the right on main entry 5; 500 feet northeast of mouth of main entry 5; 5-foot 8½-inch bed and cut).	346	14353	A	1	3.75	22.11	71.95	2.19	.58	.....	.....	.....	.....	2.7	.....	.....
	2			2	.....	22.97	74.75	2.28	.60	.....	.....	.....	.....	.....	.....	.....
	3			3	.....	23.51	76.49	.....	.61	.....	.....	.....	.....	.....	.....	.....
Same (face of room 20, off right entry 8, off main entry 4; 1,400 feet southeast of mouth of main entry 4; 5-foot 7-inch bed and cut).	346	14354	A	1	3.62	21.01	72.16	3.21	.80	.....	.....	.....	.....	2.7	.....	.....
	2			2	.....	21.80	74.87	3.33	.83	.....	.....	.....	.....	.....	.....	.....
	3			3	.....	22.55	77.45	.....	.86	.....	.....	.....	.....	.....	.....	.....
Same (face of room 2, first crosscut off first left air course off main entry 6; 1,200 feet east of mouth of main entry 6; 5-foot 8-inch bed and cut).	346	14355	A	1	3.31	21.33	72.87	2.49	.46	.....	.....	.....	.....	2.3	.....	.....
	2			2	.....	22.66	75.36	2.58	.46	.....	.....	.....	.....	.....	.....	.....
	3			3	.....	22.64	77.36	.....	.47	.....	.....	.....	.....	.....	.....	.....
Same (composite of samples 14353, 14354, and 14355).	346	14356	A	1	3.58	21.67	72.75	2.60	.64	5.01	84.38	1.65	5.72	2.6	8,195	14,751
	2			2	.....	21.85	75.45	2.70	.66	4.78	87.51	1.71	2.64	.....	8,499	15,298
	3			3	.....	22.46	77.54	.....	.68	4.91	89.93	1.76	2.72	2.8	8,734	15,721
Same (face of room 5, off the air course of main en- try 3; 500 feet southeast of mouth of main entry 3; 5-foot 2-inch bed, 6½-inch cut).	346	14357	A	1	3.95	20.61	72.94	2.50	.53	.....	.....	.....	.....	.....	.....	.....
	2			2	.....	21.46	75.94	2.60	.55	.....	.....	.....	.....	.....	.....	.....
	3			3	.....	22.03	77.97	.....	.56	.....	.....	.....	.....	.....	.....	.....
Same (pillar 17 of main entry 6; 1,040 feet south- east of mouth of main entry 6; 5-foot 10-inch bed and cut).	346	14358	A	1	3.54	20.45	73.02	2.99	.55	.....	.....	.....	.....	2.6	.....	.....
	2			2	.....	21.20	75.70	3.10	.57	.....	.....	.....	.....	.....	.....	.....
	3			3	.....	21.88	78.12	.....	.59	.....	.....	.....	.....	.....	.....	.....
Same (composite of samples 14357 and 14358).....	346	14359	A	1	3.77	21.00	72.46	2.77	.55	4.91	84.06	1.66	6.05	2.7	8,157	14,683
	2			2	.....	21.82	75.30	2.88	.57	4.67	87.36	1.73	2.79	.....	8,477	15,259
	3			3	.....	22.47	77.53	.....	.59	4.81	89.95	1.78	2.87	.....	8,729	15,712

Table of chemical analyses—(Continued).

Locality, bed, etc.	Mime notes (page).	Sample.			Proximate.				Ultimate.				Calorific value.				
		Labora- tory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
WEST VIRGINIA—Continued.																	
FAYETTE COUNTY—continued.																	
Elverton, $\frac{1}{4}$ mile west of; Elverton mine, Sewell bed (face of old Bayne entry, 3,900 feet southwest of No. 2 entrance, 3-foot 4 $\frac{1}{2}$ -inch bed and cut). Same (corner of break-through, 10 feet from face of main entry, 3,900 feet southwest of No. 2 entrance, 3-foot 2 $\frac{3}{4}$ -inch bed and cut). Same (composite of samples 14338 and 14339).....	347	14338	A	1	2.66	26.10	68.70	2.54	.53	.....	.....	.....	.....	1.5	.....	.....	.....
				2		26.81	70.58	2.61	.54	.....	.....	.....	.....	.....	.....	.....	.....
				3		27.53	72.47			.55	.....	.....	.....	.....	.....	.....	.....
		347	14339	A	1	3.18	24.47	70.23	2.12	.54	.....	.....	.....	.....	1.9	.....	.....
Same (pillar of room 2, off left entry 1, off left entry 5, 3,100 feet south of No. 2 entrance, 4-foot 7 $\frac{1}{4}$ -inch bed and cut). Same (composite of samples 14341 and 14342).....	347	14340	A	1	2.89	25.61	69.18	2.32	.55	4.99	84.11	1.64	6.39	1.7	8,220	14,796	
				2		25.37	71.24	2.39	.57	4.81	86.62	1.69	3.92	.....	8,465	15,237	
				3		27.02	72.98			4.93	88.74	1.73	4.02	1.4	8,672	15,610	
		347	14341	A	1	2.73	26.02	69.36	2.30	.66	.....	.....	.....	.....	.....	.....	.....
Same (pillar of room 3, off right entry 5, 3,100 feet southwest of No. 2 entrance, 4-foot 7 $\frac{1}{4}$ -inch bed and cut). Same (composite of samples 14341 and 14342).....	347	14342	A	1	3.26	24.59	69.65	2.50	.57	.....	.....	.....	.....	1.9	.....	.....	.....
				2		25.42	72.00			.....	.....	.....	.....	.....	.....	.....	.....
				3		26.09	73.91			.61	.....	.....	.....	.....	.....	.....	.....
		347	14343	A	1	2.99	25.27	69.36	2.38	.65	5.06	83.68	1.70	6.53	1.7	8,203	14,765
Hawks Nest, about $\frac{1}{2}$ mile north of; Mill Creek mine, Sewell bed (face of left entry 1, at room 49, 3-foot 8 $\frac{1}{2}$ -inch bed and cut). Same (face of left entry 2, at neck of room 29, 3-foot bed and cut). Same (face of third left air course, 2-foot 5 $\frac{1}{2}$ -inch bed and cut).	348	14358	A	1	3.14	26.70	73.30	3.46	.63	4.88	86.26	1.75	3.99	.....	8,466	15,221	
				2		28.10	65.30			5.00	88.43	1.79	4.09	2.1	8,668	15,602	
				3		29.01	67.42	3.57	.38	.....	.....	.....	.....	.....	.....	.....	.....
		348	14359	A	1	2.60	30.08	69.92	4.84	.78	.....	.....	.....	.....	1.6	.....	.....
Same (face of right entry 5, 2-foot 8-inch bed and cut). Same (composite of samples 14358-14361).....	348	14360	A	1	2.66	28.10	65.66	3.58	.55	.....	.....	.....	.....	1.6	.....	.....	.....
				2		28.87	67.15	3.68	.57	.....	.....	.....	.....	.....	.....	.....	.....
				3		29.97	70.03			.....	.....	.....	.....	.....	.....	.....	.....
		348	14361	A	1	3.31	27.74	65.27	3.68	.56	5.11	81.65	1.59	7.22	1.9	8,013	14,423
Same (composite of samples 14358-14361).....	348	14362	A	1	3.00	29.80	65.18	3.82	.61	5.11	81.65	1.59	7.22	1.9	8,013	14,423	
				2		28.69	67.50	3.81	.58	4.93	84.17	1.64	4.69	.....	8,261	14,870	
				3		29.83	70.17			5.13	87.62	1.71	4.88	.....	8,600	15,480	
				3		30.05	69.95			.....	.....	.....	.....	.....	.....	.....	.....

Kay Moor. $\frac{3}{4}$ mile south of: Kay Moor No. 1 mine, Sewell bed (face of room 1, off left entry 3, off third main entry, 4,700 feet south of mine mouth, 3-foot 8 $\frac{1}{2}$ -inch bed and cut).	349	14294	A	1	3.00	25.22	68.28	3.50	55	2.1	.....	.....
				2		26.00	70.39	3.61	57	.....	.....	.....
				3		26.98	73.02	.....	59	.....	.....	.....
Same (face of right entry 1 $\frac{1}{2}$, off left entry 1, off Buffalo entry, 3,300 feet southeast of mine mouth, 3-foot 10 $\frac{1}{2}$ -inch bed and cut).	349	14295	A	1	3.41	25.09	69.17	2.33	60	.....	.....	.....
				2		25.98	71.61	2.41	62	.....	.....	.....
				3		26.62	73.38	.....	64	.....	.....	.....
Same (face of left entry 1, off right entry 9, 3,300 feet west of mine mouth, 3-foot 6 $\frac{1}{2}$ -inch bed and cut).	349	14296	A	1	3.11	26.03	67.32	3.54	60	2.1	.....	.....
				2		26.87	69.48	3.65	62	.....	.....	.....
				3		27.89	72.11	.....	64	.....	.....	.....
Same (face of west, entry 11, 3,600 feet southwest of mine mouth, 3-foot 3-inch bed and cut).	349	14297	A	1	3.12	25.58	69.02	2.28	54	2.2	.....	.....
				2		26.40	71.25	2.35	56	.....	.....	.....
				3		27.04	72.96	.....	57	.....	.....	.....
Same (composite of samples 14294-14297).....	349	14298	A	1	3.17	25.11	68.81	2.91	52	2.2	8.102	14.584
				2		25.93	71.06	3.01	54	.....	8.367	15.061
				3		26.73	73.27	.....	56	.....	8.636	15.527
Same (pillar between rooms 3 and 4, off right entry 1, off main entry 7, 3-foot 4-inch bed and cut).	349	14299	A	1	3.17	25.24	67.89	3.70	51	2.2	8.055	14.499
				2		26.07	70.11	3.82	53	.....	8.318	14.972
				3		27.10	72.90	.....	55	.....	8.648	15.566
south of: Kay Moor No. 2 mine, Sewell bed (face of left entry 3, off main entry, 3-foot bed and cut).	350	14401	A	1	2.79	26.25	68.00	2.87	50	1.8	.....	.....
				2		27.40	70.05	2.95	51	.....	.....	.....
				3		27.82	72.18	.....	53	.....	.....	.....
Same (face of room 9, off left entry 2, 2-foot 11 $\frac{1}{2}$ -inch bed and cut).	350	14402	A	1	3.02	26.00	68.60	2.38	50	1.9	.....	.....
				2		26.81	70.74	2.45	52	.....	.....	.....
				3		27.48	72.52	.....	53	.....	.....	.....
Same (face of room 9, off left entry 1; 150 feet from the entry, 3-foot 4-inch bed and cut).	350	14403	A	1	3.11	25.67	67.05	4.17	56	2.0	.....	.....
				2		26.49	69.21	4.30	58	.....	.....	.....
				3		27.08	72.32	.....	61	.....	.....	.....
Same (composite of samples 14401, 14402, and 14403).	350	14404	A	1	3.03	25.73	68.11	3.13	57	1.9	8.114	14.005
				2		26.53	70.24	3.23	59	.....	8.367	15.061
				3		27.42	72.58	.....	61	.....	8.646	15.563
South Nuttal: Brown mine, Sewell bed (face of room 2, off Hill entry, 3-foot 6-inch bed, 2-foot 10-inch cut).	350	10618	A	1	3.63	23.70	70.10	2.67	73	2.8	.....	.....
				2		24.59	72.74	2.67	73	.....	.....	.....
				3		25.26	74.74	.....	75	.....	.....	.....
Same (rib of Lockett heading, between rooms 1 and 2, 2,000 feet from entry mouth, 3-foot 9 $\frac{1}{2}$ -inch bed and cut).	350	10619	A	1	3.36	24.88	68.62	3.14	68	2.5	.....	.....
				2		25.75	71.00	3.25	70	.....	.....	.....
				3		26.62	73.38	.....	72	.....	.....	.....
Same (neck of room 1, off right entry 6, off Wheeler entry, 3-foot 5-inch bed and cut).	350	10620	A	1	3.81	23.32	70.16	2.71	52	3.0	.....	.....
				2		24.21	72.94	2.82	54	.....	.....	.....
				3		24.94	75.06	.....	56	.....	.....	.....
Same (neck of room 4, off left entry 2, off entry 18, 3-foot 6-inch bed and cut).	350	10621	A	1	3.45	23.91	70.39	2.55	55	2.6	.....	.....
				2		24.76	72.91	2.53	57	.....	.....	.....
				3		25.35	74.05	.....	58	.....	.....	.....
Same (left rib near face of entry 18, 3-foot 5 $\frac{1}{2}$ -inch bed and cut).	350	10622	A	1	3.32	24.02	69.35	2.41	51	2.5	.....	.....
				2		25.77	71.71	2.49	53	.....	.....	.....
				3		26.43	73.57	.....	54	.....	.....	.....
Same (composite of samples 10618-10622).....	351	10623	A	1	3.51	24.76	69.00	2.73	58	2.7	8.146	14.063
				2		25.66	71.51	2.83	60	.....	8.443	15.197
				3		26.41	73.59	.....	62	.....	8.689	15.640

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.						Ultimate.				Calorific value.	
		Laboratory No.	Kind.	Con- diti- on.	Mols- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WEST VIRGINIA—Continued.																
FAYETTE COUNTY—continued.																
Thayer, Ephraims Creek (Buffalo) mine, Fire Creek bed (face of room 5, off right entry 5, off Slater entry, 3-foot 6-inch bed and cut).	351	10629	A	1	3.17	18.46	70.86	7.51	1.07	4.84	79.07	1.56	5.95	2.5	7,775	13,995
				2	2	19.06	73.18	7.76	1.10	4.64	81.06	1.61	3.23		8,029	14,452
				3		20.66	79.34		1.19	5.03	88.53	1.75	3.50		8,704	15,667
GREENBRIER COUNTY.																
Richwood, 9 miles southeast of Spruce Knob mine, Sewell bed (in mine, 1,500 feet southwest of mine mouth; 4-foot 10-inch bed; 4-foot 1-inch cut).	352	13547	B	1	3.91	26.20	64.09	5.80	.62	5.00	79.33	1.59	7.66	3.1	7,810	14,058
				3		27.27	66.69	6.04	.65	4.76	82.56	1.65	4.34		8,128	14,630
				3		29.02	70.98		.69	5.07	87.87	1.76	4.61		8,651	15,572
M'DOWELL COUNTY.																
Algoma, 1 mile east of Piney mine, Pocahontas No. 3 bed (face of main entry, 6-foot 1-inch bed, 5-foot 10-inch cut).	352	14154	A	1	2.50	17.84	74.30	5.36	.52					1.8		
				2		18.30	76.30	5.50	.53							
				3		19.37	80.63		.56							
Same (face of room 14, off cross entry 10, 5-foot 3-inch bed, 5-foot 1½-inch cut).	352	14155	A	1	2.60	18.59	74.19	4.62	.47					1.9		
				2		19.09	76.17	4.74	.48							
				3		20.04	79.96		.50					2.0		
Same (face of room 30, off cross entry 8, 5-foot 6-inch bed, 5-foot 3-inch cut).	352	14156	A	1	2.70	17.87	75.12	4.31	.44							
				2		18.36	77.21	4.43	.45							
				3		19.21	80.79		.47							
Same (composite of samples 14154, 14155, and 14156)	352	14157	A	1	2.58	18.10	74.58	4.74	.47	4.52	84.25	1.17	4.85	1.9	8,086	14,355
				2		18.58	76.55	4.87	.48	4.34	86.48	1.20	2.63		8,300	14,940
				3		19.53	80.47		.50	4.56	90.91	1.26	2.77		8,725	15,705
Same (pillar of room 15, off cross entry 5, 6-foot 7-inch bed, 6-foot 4-inch cut).	352	14158	A	1	2.80	17.61	74.41	5.18	.64					2.1		
				2		18.12	76.55	5.33	.66							
				3		19.14	80.86		.70							
Same (rib of room 33, off cross entry 7, 5-foot 6-inch bed, 5-foot 3-inch cut).	352	14159	A	1	2.63	18.09	74.74	4.54	.47					1.9		
				2		18.58	76.76	4.66	.48							
				3		19.49	80.51		.50							
Same (pillar of room 15, off cross entry 6, 6-foot 4-inch bed, 6-foot ½-inch cut).	352	14160	A	1	2.39	17.71	75.61	4.29	.69					1.7		
				2		18.14	77.46	4.40	.71							
				3		18.97	81.03		.74							

Table of chemical analyses—Continued.

Mine notes (page).	Sample.			Proximate.				Ultimate.					Calorific value.			
	Laboratory No.	Kind.	Con-dition.	Mois-ture.	Vola-tile mat-ter.	Fixed car-bon.	Ash.	Sul-phur.	Hy-dro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.	Air-dry-ing loss.	Calo-ries.	British thermal units.	
Locality, bed, etc.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WEST VIRGINIA—Continued.																
M'DOWELL COUNTY—continued.																
Jed; Havaco (formerly Jed) mine, Pocahontas No. 3 bed (face of first butt left entry; 5-foot 1½-inch bed, 4-foot 9½-inch cut).	355	13775	A	1	2.08	16.39	76.60	4.93	.90	4.20	84.87	1.16	3.94	1.5	8,100	14,580
Jenkinjones; Pocahontas No. 6 mine, Pocahontas No. 3 bed (face of main heading, 250 feet west of mine mouth; 9-foot 6-inch bed, 8-foot 1½-inch cut).	356	14185	A	1	3.01	22.04	69.46	5.49	.97	4.05	86.67	1.18	2.15	...	8,272	14,890
Same (face of aircourse, 250 feet from mine mouth; 10-foot 2½-inch bed, 9-foot 2½-inch cut).	356	14186	A	1	3.66	21.08	75.92	5.66	.51	4.26	91.26	1.24	2.27	2.4	8,710	15,678
Same (composite of samples 14185, 14186, and 14187).	356	14188	A	1	3.36	23.57	76.43	5.28	.52	4.83	82.51	1.22	5.64	2.7	7,983	14,369
½-mile south of; Pocahontas No. 6 B mine, Pocahontas No. 3 bed (face of main heading, 500 feet from mine mouth; 10-foot 6½-inch bed, 9-foot 5-foot cut).	356	14187	A	1	3.23	22.45	67.83	6.49	.48	4.62	85.38	1.26	2.74	...	8,201	14,870
Same (face of first right cross heading, 350 feet from mine mouth; 9-foot 4-inch bed, 8-foot 10-inch cut).	356	14189	A	1	3.27	22.88	69.36	4.49	.44	4.89	90.31	1.33	2.90	2.6	8,798	15,729
½-mile south of; Pocahontas No. 7 A mine, Pocahontas No. 3 bed (face of main heading, 120 feet from mine mouth; 7-foot 10-inch bed, 7-foot 1½-inch cut).	356	14190	A	1	4.09	22.07	69.05	4.79	.47	5.54	85.38	1.26	2.74	...	8,201	14,870
Leckie, ½ mile east of; Leckie No. 1 mine, Pocahontas No. 3 bed (face of room 1, off Monkey heading, 1,700 feet west of mine mouth, 8-foot 2½-inch bed, 7-foot 10-inch cut).	357	14271	A	1	3.53	17.95	75.48	3.04	.53	4.89	90.31	1.33	2.90	2.6	8,798	15,729
Same (face of Monkey heading, 1,900 feet west of mine mouth, 8-foot 1½-inch bed, 7-foot 6½-inch cut).	357	14272	A	1	3.39	18.56	74.81	3.24	.52	4.89	90.31	1.33	2.90	2.6	8,798	15,729
Same (face of Kick-back heading, 1,250 feet north-west of mine mouth, 7-foot 10½-inch bed, 7-foot 7½-inch cut).	357	14273	A	1	4.38	18.12	73.92	3.58	.52	4.89	90.31	1.33	2.90	2.6	8,798	15,729

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Condition.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Air-drying loss.	Calories.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WEST VIRGINIA—Continued.																
M'DOWELL COUNTY—continued.																
Rofe, 3 miles from North Fork; Rofe mine, Pocahontas No. 3 bed (face of B-2 butt entry off B entry, 5,800 feet northwest of mine mouth, 5-foot 3-inch bed, 4-foot 11-inch cut).	360	14394	A	1	2.63	18.08	73.07	6.22	.48					1.8		
				2	.....	18.57	75.04	6.39	.49							
				3	.....	19.84	80.16		.52							
Same (face of B-1 butt entry, off B entry, 6,250 feet northwest of mine mouth, 5-foot 1-inch bed, 4-foot 10-inch cut).	360	14395	A	1	2.77	17.77	74.55	4.91	.52					2.0		
				2	.....	18.28	76.67	5.05	.53							
				3	.....	19.25	80.75		.56							
Same (face of left boundary heading, 6,200 feet northwest of mine mouth, 5-foot 2-inch bed, 4-foot 10-inch cut).	360	14396	A	1	2.76	17.99	74.20	5.05	.48					2.0		
				2	.....	18.50	76.31	5.19	.49							
				3	.....	19.51	80.49		.52							
Same (face of room 15, off 3-A entry, off right entry 1, 5,100 feet northeast of mine mouth, 5-foot 1-inch bed, 4-foot 6½-inch cut).	360	14397	A	1	2.65	17.91	76.10	3.34	.50					1.9		
				2	.....	18.40	78.17	3.43	.51							
				3	.....	19.05	80.95		.53							
Same (face of room 18, off 2-A entry, off right entry 2, 5,000 feet northeast of mine mouth, 5-foot 1½-inch bed, 4-foot 7-inch cut).	360	14398	A	1	3.10	17.36	73.76	3.58	.48					2.2		
				2	.....	18.12	78.19	3.69	.50							
				3	.....	18.81	81.19		.52							
Same (composite of samples 14394-14398).	360	14399	A	1	2.82	17.67	74.95	4.56	.49	4.58	83.92	1.23	5.22	2.0	8,006	14,573
				2	.....	18.18	77.43	4.69	.50	4.39	86.35	1.27	2.80		8,331	14,966
				3	.....	19.07	80.93		.52	4.61	90.60	1.33	2.94		8,741	15,734
Same (pillar of room 4, off right entry 1, 4,200 feet east of mine mouth, 4-foot 10-inch bed, 4-foot 4-inch cut).	360	14400	A	1	3.03	18.06	76.22	2.69	.55					2.3	8,259	14,866
				2	.....	18.62	78.61	2.77	.57						8,517	15,331
				3	.....	19.15	80.85		.59						8,700	15,768
Susana station (Yukon post office), ½ mile west of; Yukon-Pocahontas mine, War Creek bed (face of room 24, off main air course, 1,700 feet southwest of main opening, 4-foot ½-inch bed, 3-foot 8½-inch cut).	361	14426	A	1	1.84	16.89	72.87	8.40	.55					.8		
				2	.....	17.21	71.23	8.56	.56							
				3	.....	18.82	81.18		.61							
Same (face of main entry, 1,850 feet southwest of main opening, 5-foot ½-inch bed, 3-foot 8-inch cut)	361	14427	A	1	2.11	17.01	73.39	7.49	.51					1.1		
				2	.....	17.38	74.97	7.65	.52							
				3	.....	18.82	81.18		.56							

Table of chemical analyses—Continued.

M ne notes (page).	Locality, bed, etc.	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No.	K.ind.	Con- diti- on.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
2	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WEST VIRGINIA—Continued.																
M'DOWELL COUNTY—continued.																
363	Welch, 2 miles west of, Hemphill Township; Oregon No. 2 mine, Pocahontas No. 4 bed (face of main entry 4,000 feet south of mine mouth, 3-foot 1-inch bed and cut).	14215	A	1 2 3	2.41	18.72 19.18 20.75	71.47 73.24 79.25	7.40 7.58	.52 .53 .57	.....	.....	.....	.....	1.7	.....	.....
363	Same (rib of room 11, off air course, 100 feet from face, and 3,500 feet southeast of mine mouth, 3-foot 4-inch bed and cut).	14216	A	1 2 3	2.22	18.08 18.49 19.98	72.41 74.05 80.02	7.29 7.46 8.89	.53 .54 .58	.....	.....	.....	.....	1.6	.....	.....
363	2 miles west of, Hemphill Township; Oregon No. 3 mine, Pocahontas No. 4 bed (face of main entry, 3,000 feet southwest from mine mouth; 3-foot 7-inch bed and cut).	14212	A	1 2 3	2.54	18.41 18.89 20.79	70.16 71.99 79.21	8.89 9.12	.63 .65 .72	.....	.....	.....	.....	1.8	.....	.....
363	Same (face of room 16, off left entry 4, 2,000 feet south of mine mouth, 3-foot 5-inch bed and cut).	14213	A	1 2 3	2.60	18.20 18.69 20.15	72.13 74.05 79.85	7.07 7.26	.67 .69 .74	.....	.....	.....	.....	1.9	.....	.....
363	Same (pillar of room 1, off left entry 1, 800 feet southeast of mine mouth, 4-foot 1-inch bed and cut).	14214	A	1 2 3	3.85	18.68 19.43 20.98	70.38 73.20 79.02	7.09 7.37	.52 .54 .58	.....	.....	.....	.....	2.8	.....	.....
364	Same (composite of samples 14212-14216—includes samples from No. 2 mine).	14217	A	1 2 3	2.76	18.54 19.07 20.67	71.19 73.21 79.33	7.51 7.72	.59......66	4.40 4.21 4.56	80.64 82.93 89.87	1.43 1.47 1.59	5.43 3.06 3.32	2.0	7,790 8,011 8,420	14,022 14,420 15,628
364	2 miles west of, Standard Pocahontas mine, Pocahontas No. 3 bed (face of main entry in No. 2 shaft, 85 feet from foot of shaft, 5-foot 3-inch bed, 4-foot 8½-inch cut).	12512	A	1 2 3	3.68	15.34 15.93 17.23	73.72 76.53 82.77	7.26 7.54	.89 .92 .99	.....	.....	.....	.....	3.0	7,726 8,021 8,675	13,907 14,438 15,615
364	Same (face of entry driven from No. 1 shaft to connect with No. 2 shaft, about 120 feet from bottom of shaft No. 2, 4-foot 11-inch bed, 4-foot 8½-inch cut).	12513	A	1 2 3	2.36	15.48 15.85 17.07	75.16 76.98 82.93	7.00 7.17	1.00 1.02 1.10	.....	.....	.....	.....	1.8	7,894 8,085 8,709	14,209 14,553 15,676

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.					Ultimate.					Calorific value.	
		Laboratory No.	Kind.	Con-dition.	Mois-ture.	Vola-tile mat-ter.	Fixed carbon.	Ash.	Sul-phur.	Hy-dro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.	Air-dry-ing loss.	Calo-ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WEST VIRGINIA—Continued.																
MARSHALL COUNTY.																
Moundsville, 1 mile south of; Panama mine, Pittsburgh bed (face of second south air course, 2,050 feet southeast of shaft, 4-foot 9½-inch bed, 4-foot 8½-inch cut). Same (face of room 3, off right entry 2, off north entry 2, 1,700 feet northeast of shaft, 4-foot 7½-inch bed, 4-foot 5½ inch cut). Same (composite of samples 14486 and 14487)	367	14486	A	1	3.35	41.35	48.29	7.01	3.19					1.6		
				2		42.78	49.07	7.25	3.30							
				3		46.13	53.87		3.56							
		367	14487	A	1	3.52	41.08	48.34	7.06	3.24					1.8	
				2		42.58	50.10	7.32	3.36							
				3		45.94	54.06		3.63							
Same (composite of samples 14486 and 14487)	367	14488	A	1	3.39	41.58	48.01	7.02	3.25	5.38	72.86	1.32	10.17	1.7	7,396	13,313
				2		43.04	49.69	7.27	3.36	5.18	75.42	1.37	7.40		7,656	13,781
				3		46.41	53.59		3.62	5.59	81.33	1.48	7.98		8,256	14,861
MERCER COUNTY.																
Crystal, ½-mile southeast of; Godfrey mine, Pocahontas No. 3 bed (pillar of right entry 2, 1,100 feet northeast of mine mouth, 4-foot bed, 3-foot 7-inch cut). Same (room 3, off left heading 2, off old main entry, 700 feet southeast of mine mouth, 4-foot 3-inch bed, 4-foot cut). Same (composite of samples 14258 and 14259)	368	14258	A	1	2.74	18.41	75.33	3.52	71					2.0		
				2		18.93	77.45	3.62	73							
				3		19.64	80.36		76					2.6		
		368	14259	A	1	3.36	17.68	74.76	4.20	72						
				2		18.30	77.35	4.35	75							
				3		19.13	80.87		78							
	368	14260	A	1	3.06	18.24	74.84	3.98	71	4.74	84.32	1.12	5.25	2.3	8,160	14,088
				2		18.82	77.20	3.87	73	4.54	86.98	1.16	2.61		8,418	15,152
				3		19.60	80.40	3.96	76	4.73	90.58	1.21	2.72		8,767	15,781
				2		17.99	75.20	3.55	68					2.5	8,163	14,693
				3		18.60	77.73	3.67	70						8,438	15,188
Same (face of room 4, next to "Crystal," 4-foot 7-inch bed, 4-foot 3-inch cut).	368	14261	A	1	3.26	18.60	77.73	3.67	73						8,759	15,766
				2		19.31	80.69		73					2.4		
				3		18.91	73.92	4.03	58							
Goodwill, ½ mile northeast of; Goodwill mine, Pocahontas No. 3 bed (face of room 16, off eighth left cross-entry, 3,700 feet northeast of No. 3 drift mouth, 4-foot 9-inch bed, 4-foot 4-inch cut).	369	14163	A	1	3.14	18.91	73.92	4.03	58							
				2		19.52	76.32	4.16	60							
				3		20.37	79.63		63							

Table of chemical analyses—Continued.

Mine notes (page).	Locality, bed, etc.	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Con-dition.	Mois-ture.	Vol-a-tile mat-ter.	Fixed bon.	Ash.	Sul-phur.	Hy-dro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.	Air-dry-ing loss.	Calo-ries.	British thermal units.
2	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WEST VIRGINIA—Continued.																
MERCER COUNTY—continued.																
Mateoka,	Pawama No. 2 mine, Pocahontas No. 3 bed (face of Roundke heading, 2,000 feet southwest of mine mouth, 4-foot 4½-inch bed, 4-foot 2-inch cut).	14231	A	1	4.35	17.33	74.16	4.16	75					3.7		
				2		18.12	77.53	4.35	78							
				3	3.28	18.94	81.06			82						
371	Same (face of main entry, 2,600 feet southwest of mine mouth, 4-foot 3½-inch bed, 4-foot 1-inch cut).	14232	A	1	3.28	17.14	73.57	4.01	77					2.6		
				2		17.72	78.13	4.15	80							
				3		18.49	81.51		83							
371	Same (face of room 20, off Norfolk entry, 2,300 feet southwest of mine mouth, 4-foot 5½-inch bed, 4-foot cut).	14233	A	1	3.02	17.59	75.00	4.39	78					2.3		
				2		18.14	77.33	4.53	80							
				3		19.00	81.00		84							
371	Same (composite of samples 14231, 14232, and 14233).	14234	A	1	3.61	17.41	74.84	4.14	76	4.57	83.68	1.12	5.73	2.9	8,104	14,587
				2		18.06	77.64	4.30	79	4.33	86.82	1.16	2.60		8,408	15,134
				3		18.87	81.13		83	4.52	90.72	1.21	2.72		8,786	15,815
372	Mora, ½ mile west of; Crane Creek No. 1 mine, Pocahontas No. 3 bed (face of main heading, 4-foot 11-inch bed, 4-foot 6½-inch cut).	W 32517	A	1	2.3	18.0	73.3	6.4	60						7,978	14,360
				2		19.7	80.3		64						8,167	14,700
				3		19.7	74.3	5.5	55						8,733	15,720
372	Same (face of eighteenth cross air course, 4-foot 9-inch bed, 4-foot 4½-inch cut).	W 32518	A	1	2.3	18.3	76.1	5.6	55						8,072	14,530
				2		18.3	76.1		58						8,267	14,880
				3		19.4	80.6		58						8,756	15,760
372	Same (pillar beyond second break-through in room 11, off cross entry 16, 5-foot 7½-inch bed, 5-foot 3-inch cut).	W 32519	A	1	2.2	17.0	75.1	5.7	70						8,083	14,550
				2		17.4	76.8	5.8	70						8,267	14,880
				3		18.5	81.5		74						8,778	15,800
372	Same (pillar beyond second break-through in room 21, off cross entry 6, 4-foot 5-inch bed, 4-foot 3½-inch cut).	W 32520	A	1	2.4	17.6	74.9	5.1	65						8,128	14,630
				2		18.0	76.8	5.2	65						8,322	14,980
				3		19.0	81.0		69						8,778	15,800
372	¾ mile west of; Crane Creek No. 2 mine, Pocahontas No. 3 bed (cut from pocket beyond second break-through in room 4, off cross entry 3, 5-foot 4-inch bed, 4-foot 4½-inch cut).	W 32600	A	1	3.3	17.5	73.7	5.5	55						7,967	14,340
				2		18.1	76.2	5.7	55						8,244	14,840
				3		19.2	80.8		58						8,744	15,740
372	Same (face of room 14, off Allegheny entry, 5-foot 3-inch bed, 4-foot 10-inch cut).	W 32601	A	1	2.0	18.5	75.5	4.0	60						8,256	14,860
				2		18.9	77.0	4.1	60						8,422	15,160
				3		19.7	80.3		63						8,783	15,810

372	W32602	A	1	2.1	18.8	74.9	4.2	55	8,200	14,760
			2	.....	19.2	76.5	4.3	55	8,378	15,080
372	W32603	A	1	2.4	18.3	73.9	3.9	57	8,756	15,760
			2	.....	18.8	77.2	4.0	55	8,211	14,780
			3	.....	19.6	80.4	.....	57	8,411	15,140
373	W32604	A	1	2.4	18.1	76.3	3.2	55	8,761	15,770
			2	.....	18.6	78.1	3.3	55	8,261	14,870
			3	.....	19.2	80.8	.....	57	8,756	15,760
373	W32605	A	1	2.7	17.3	76.4	3.6	55	8,217	14,790
			2	.....	17.8	78.5	3.7	57	8,444	15,200
			3	.....	18.5	81.5	.....	57	8,767	15,780
373	W32606	A	1	2.4	17.8	75.7	4.1	60	8,183	14,730
			2	.....	18.2	77.6	4.2	60	8,383	15,090
			3	.....	19.0	81.0	.....	63	8,750	15,750
373	W32607	A	1	2.4	18.3	75.5	3.8	55	8,200	14,760
			2	.....	18.7	77.4	3.9	55	8,400	15,120
			3	.....	19.5	80.5	.....	57	8,744	15,740
373	W32608	A	1	2.6	17.8	75.9	3.7	60	8,211	14,780
			2	.....	18.3	77.9	3.8	60	8,433	15,180
			3	.....	19.0	81.0	.....	62	8,767	15,780
373	W32609	A	1	2.8	17.1	76.3	3.8	55	8,172	14,710
			2	.....	17.6	78.5	3.9	55	8,406	15,130
			3	.....	18.3	81.7	.....	57	8,744	15,740
374	14250	A	1	2.53	18.56	74.89	4.02	52	1.8	.....
			2	.....	19.04	76.84	4.12	53	.....	.....
			3	.....	19.86	80.14	.....	55	.....	.....
374	14251	A	1	3.20	18.43	74.24	4.13	57	2.4	.....
			2	.....	19.04	76.69	4.27	59	.....	.....
			3	.....	19.89	80.11	.....	62	.....	.....
374	14252	A	1	3.53	18.20	74.99	3.28	54	2.7	.....
			2	.....	18.87	77.73	3.40	56	.....	.....
			3	.....	19.53	80.47	.....	58	.....	.....
375	14253	A	1	3.36	18.33	74.93	3.38	57	2.6	.....
			2	.....	18.97	77.53	3.50	59	.....	.....
			3	.....	19.66	80.34	.....	61	.....	.....
375	14254	A	1	2.62	18.56	74.98	3.84	55	1.8	.....
			2	.....	19.06	77.00	3.94	56	.....	.....
			3	.....	19.84	80.16	.....	58	.....	.....
375	14255	A	1	3.24	18.24	75.19	3.33	61	2.4	.....
			2	.....	18.85	77.71	3.44	63	.....	.....
			3	.....	19.52	80.48	.....	65	.....	.....
375	14256	A	1	3.11	18.18	73.38	5.33	56	2.3	.....
			2	.....	18.76	75.74	5.50	58	.....	.....
			3	.....	19.85	80.15	.....	61	.....	.....
375	14257	A	1	3.16	18.17	74.69	3.98	56	2.3	.....
			2	.....	18.76	77.13	4.11	58	.....	.....
			3	.....	19.56	80.44	.....	60	.....	.....

Same (chain pillar between rooms 21 and 22, off Blue Ridge entry, 5-foot $\frac{1}{2}$ -inch bed, 4-foot 9-inch cut).

Same (face of room 13, off Bryant entry, 4-foot 8 $\frac{1}{2}$ -inch bed, 4-foot 1-inch cut).

1 mile north of; Pinnacle mine, Pocahontas No. 3 bed (face of cross entry 2, north mine, 4-foot 2 $\frac{1}{2}$ -inch bed, 3-foot 11 $\frac{1}{2}$ -inch cut).

Same (face of north main heading, 4-foot 4 $\frac{1}{2}$ -inch bed, 4-foot cut).

Same (face of pocket in first pillar of room 25, cross entry 2, off main heading, 4-foot 8 $\frac{1}{2}$ -inch bed, 4-foot 3-inch cut).

Same (face of break-through off Cuba entry, off main heading 2, 4-foot 9 $\frac{1}{2}$ -inch bed, 4-foot 4-inch cut).

Same (face of main heading 2, 4-foot 8 $\frac{1}{2}$ -inch bed, 4-foot 4-inch cut).

Same (pillar of room 16, off cross entry 4, off main heading 1, 4-foot 11-inch bed, 4-foot 6-inch cut).

1 mile west of; Sagamore No. 1 mine, Pocahontas No. 3 bed (face of main straight entry H, 2,550 feet northwest of mine mouth, 5-foot bed, 3-foot 11-inch cut).

Same (face of G-1 heading, 2,250 feet west of mine mouth, 5-foot 6 $\frac{1}{2}$ -inch bed, 4-foot 9-inch cut).

Same (face of room 11, off G-2 heading, 1,900 feet southwest of mine mouth, 5-foot 11-inch bed, 4-foot 11-inch cut).

1 mile east of; Sagamore No. 2 mine (face of H-8 entry, 2,550 feet southeast of mine mouth, 4-foot 6-inch bed, 4-foot 2-inch cut).

Same (face of G-6 entry, 2,300 feet southwest of mine mouth, 4-foot 5 $\frac{1}{2}$ -inch bed, 4-foot 1 $\frac{1}{2}$ -inch cut).

Same (face of G-8 entry, 2,550 feet south of mine mouth, 4-foot 6-inch bed, 4-foot 2-inch cut).

Same (face of straight H air course, 2,350 feet southeast of mine mouth, 4-foot 6-inch bed and cut).

Same (composite of samples 14250-14256).....

Table of chemical analyses—Continued.

Mine notes (page).	Locality, bed, etc.	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
2	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WEST VIRGINIA—Continued.																
MERCER COUNTY—continued.																
376	Weyanoke; Weyanoke No. 1 mine; Pocahontas No. 3 bed (face of room 11, off left entry 9, off main heading, 4-foot 1½-inch bed, 3-foot 11-inch cut).	14224	A	1	2.57	18.66	75.35	3.42	.56					3.0		
				2		19.15	77.34	3.51	.57							
376	Same (face of main air course; 4-foot ¾-inch bed, 3-foot 10-inch cut).	14225	A	3	2.74	19.85	80.15		.59							
				1		18.81	74.42	4.03	.60					2.1		
				2		19.34	76.82	4.14	.62							
				3		20.18	79.82		.65							
376	Same (face of room 22, off left cross heading 8, 4-foot 6-inch bed, 4-foot 3-inch cut).	14226	A	1	3.25	17.33	75.40	4.02	.63					2.6		
				2		17.91	77.93	4.16	.65							
				3		18.09	81.31		.68							
376	Same (face of room 6, off left entry 6, 4-foot 3½-inch bed, 4-foot cut).	14228	A	1	3.22	17.84	75.47	3.47	.59					2.5		
				2		18.43	77.08	3.59	.61							
				3		19.12	80.88		.63							
376	Weyanoke No. 2 mine; Pocahontas No. 3 bed (face of right entry 3, off main entry, 4-foot bed, 3-foot 11-inch cut).	14227	A	1	3.10	18.06	75.63	3.21	.64					2.5		
				2		18.64	78.05	3.31	.66							
				3		19.28	80.72		.68							
376	Same (pillar of last crosscut in room 7, off left butt entry 2; 4-foot 4-inch bed, 3-foot 11-inch cut).	14230	A	1	2.74	17.84	75.48	3.94	.63					2.0		
				2		18.34	77.41	4.05	.68							
				3		19.11	80.89		.65							
376	Same (composite of samples 14224, 14225, 14226, 14227, and 14228).	14229	A	1	2.97	17.72	75.68	3.63	.65	4.52	85.26	1.16	4.78	2.3		
				2		18.26	78.00	3.74	.67	4.32	87.87	1.20	2.20			
				3		18.97	81.03		.70	4.49	91.29	1.25	2.27			
MONONGALIA COUNTY.																
377	Richard, ¼ mile northeast of Elkins No. 1 mine, Upper Freeport bed (face of fifth right "flat," 4.200 feet northeast of mine mouth, 4-foot ¾-inch bed, 3-foot 10½-inch cut).	W19475	A	1	2.2	28.7	62.1	7.0	.80							
				2		29.4	63.4	7.2	.80							
				3		31.7	68.3		.86							
377	Same (face of butt entry 8 off right entry 5, 700 feet from main entry, 3-foot 7½-inch bed, 3-foot 6-inch cut).	W19476	A	1	2.6	27.2	61.9	8.3	.90							
				2		27.9	63.6	8.5	.95							
				3		30.5	69.5		1.04							

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.				Ultimate.					Calorific value		
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries, thermal units.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WEST VIRGINIA—Continued.																
RALEIGH COUNTY—continued.																
McQuade station, 2 miles southeast of Raleigh; Blue Jay No. 4 mine, Beckley bed (pillar of main heading, 600 feet east of mine mouth, 4-foot 11-inch bed, 4-foot 2-inch cut).	379	14288	A	1	3.53	19.01	74.38	3.08	.75	.....	.....	.....	.....	2.4	.....	.....
				2	.....	19.71	77.10	3.19	.78	.....	.....	.....	.....	.....	.....	.....
				3	.....	20.36	79.64	.....	.81	.....	.....	.....	.....	.....	.....	.....
Same (face of right heading 2; 400 feet south of mine mouth; 4-foot 5-inch bed, 4-foot 2-inch cut).	379	14289	A	1	2.89	19.49	73.29	4.33	.78	.....	.....	.....	.....	1.8	.....	.....
				2	.....	20.07	75.47	4.46	.80	.....	.....	.....	.....	.....	.....	.....
				3	.....	21.01	78.99	.....	.84	.....	.....	.....	.....	.....	.....	.....
Same (pillar of right heading 1; 250 feet south of mine mouth; 4-foot 5-inch bed and cut).	379	14290	A	1	3.40	18.74	72.56	5.30	.66	.....	.....	.....	.....	2.3	.....	.....
				2	.....	19.40	75.11	5.49	.68	.....	.....	.....	.....	.....	.....	.....
				3	.....	20.53	79.47	.....	.72	.....	.....	.....	.....	.....	.....	.....
Same (composite of samples 14288, 14289, and 14290).	380	14291	A	1	3.29	18.96	73.46	4.29	.74	4.78	82.96	1.61	5.62	2.2	8,066	14,519
				2	.....	19.60	75.96	4.44	.77	4.56	85.78	1.66	2.79	.....	8,340	15,012
				3	.....	20.51	79.49	.....	.81	4.77	89.77	1.74	2.91	.....	8,728	15,710
Raleigh; No. 1 mine, Beckley bed (neck of the last break-through off right entry 6, 5-foot 1½-inch bed and cut).	380	10630	A	1	2.80	17.99	75.61	3.60	.63	5.05	83.72	1.56	5.44	2.3	8,170	14,706
				2	.....	18.51	77.79	3.70	.65	4.88	86.13	1.60	3.04	.....	8,405	15,129
				3	.....	19.22	80.78	.....	.67	5.07	89.44	1.66	3.16	.....	8,728	15,710
No. 3 mine, Beckley bed (left rib of left entry 7, opposite mouth of right heading 1, 5-foot 2½-inch bed and cut).	380	10624	A	1	3.47	18.07	74.87	3.59	.66	.....	.....	.....	.....	2.9	.....	.....
				2	.....	19.44	80.56	3.72	.68	.....	.....	.....	.....	.....	.....	.....
				3	.....	19.14	80.56	.....	.71	.....	.....	.....	.....	.....	.....	.....
Same (face of right entry 15, 4-foot 2-inch bed and cut).	380	10625	A	1	1.58	18.87	76.37	3.18	.68	.....	.....	.....	.....	1.1	.....	.....
				2	.....	19.17	77.60	3.23	.69	.....	.....	.....	.....	.....	.....	.....
				3	.....	19.81	80.19	.....	.71	.....	.....	.....	.....	.....	.....	.....
Same (last crosscut in main entry, 4-foot 1½-inch bed and cut).	380	10626	A	1	8.77	17.22	70.35	3.75	.73	.....	.....	.....	.....	8.2	.....	.....
				2	.....	18.87	77.02	4.11	.80	.....	.....	.....	.....	.....	.....	.....
				3	.....	19.68	80.32	.....	.83	.....	.....	.....	.....	.....	.....	.....
Same (face of room 11, off right heading 12, 3-foot 7½-inch bed and cut).	380	10627	A	1	2.76	19.89	73.82	3.53	.81	.....	.....	.....	.....	2.3	.....	.....
				2	.....	20.45	75.92	3.63	.83	.....	.....	.....	.....	.....	.....	.....
				3	.....	21.22	78.78	.....	.86	.....	.....	.....	.....	.....	.....	.....
Same (composite of samples 10624-10627).....	380	10628	A	1	4.37	18.06	74.08	3.49	.71	4.95	82.72	1.49	6.64	3.8	8,039	14,470
				2	.....	18.89	77.46	3.65	.74	4.66	86.50	1.56	2.89	.....	8,406	15,131
				3	.....	19.61	80.39	.....	.77	4.84	89.78	1.62	2.99	.....	8,724	15,703

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.				Ultimate.					Calorific value.		
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WEST VIRGINIA—Continued.																
RALEIGH COUNTY—continued.																
Slab Fork, $\frac{1}{4}$ mile south of; Slab Fork No. 5 mine, Beck- ley bed (pillar of room 10, off left entry 2; 800 feet south of mine mouth; 4-foot $\frac{1}{4}$ -inch bed, 3-foot $\frac{1}{4}$ -inch cut).	382	14316	A	1	3.10	17.37	76.91	2.62	.49					2.3	8,234	14,821
				2		17.93	79.37	2.70	.51						8,497	15,295
				3			18.43	81.57		.52						8,732	15,718
Same (composite of samples 14313-14316).....	382	14317	A	1	3.33	17.35	76.03	3.29	.47	4.80	84.37	1.58	5.49	2.7	8,169	14,704
				2		17.95	78.65	3.40	.49	4.58	87.27	1.63	2.72		8,450	15,210
				3		18.58	81.42		.51	4.74	90.34	1.69	2.72		8,747	15,745
Same (pillar of left entry 4, between rooms 13 and 14; 1,250 feet south of the mine mouth; 3-foot 9 $\frac{1}{2}$ -inch bed and cut).	382	14318	A	1	3.70	17.24	76.19	2.87	.48	4.74	84.59	1.53	5.79	2.9	8,149	14,668
				2		17.90	79.12	2.98	.50	4.50	87.84	1.59	2.59		8,462	15,232
				3		18.45	81.55		.52	4.64	90.54	1.64	2.66		8,722	15,700
Winding Gulf, $\frac{1}{4}$ mile south of; Lynnwin mine, Beckley bed (break-through to air course at left entry 6; 2,600 feet from mine mouth; 5-foot 4-inch bed, 5-foot cut).	383	14319	A	1	3.16	17.28	75.96	3.60	.70					2.4		
				2		17.84	78.44	3.72	.72							
				3		18.53	81.47		.75							
Same (face of right heading 6; 2,800 feet from mine mouth, 4-foot 9-inch bed; 4-foot 4-inch cut).	383	14320	A	1	2.73	17.98	75.75	3.54	.71					1.9		
				2		18.49	77.87	3.64	.73							
				3		19.19	80.81		.76							
Same (face of room 2, off right heading 8; 3,300 feet from mine mouth; 5-foot 2-inch bed, 4-foot 9-inch cut).	383	14321	A	1	2.73	17.08	75.53	4.66	.96					1.9		
				2		17.56	77.65	4.79	.99							
				3		18.44	81.56		1.04							
Same (face of right heading 8, about 3,400 feet from mine mouth, 5-foot 2-inch bed, 4-foot 7-inch cut).	383	14322	A	1	2.75	17.49	74.50	5.26	.66					2.0		
				2		17.98	76.61	5.41	.68							
				3		19.01	80.99		.72							
Same (face of main heading; 3,200 feet from mine mouth, 5-foot 3-inch bed, 4-foot $\frac{1}{4}$ -inch cut).	383	14323	A	1	3.15	17.27	75.58	4.00	.75					2.4		
				2		17.83	78.04	4.13	.77							
				3		18.60	81.40		.80							
Same (composite of samples 14319-14323).....	383	14324	A	1	2.83	17.73	75.23	4.21	.81	4.56	84.03	1.53	4.86	2.1	8,088	14,558
				2		17.73	75.23	4.33	.83	4.37	86.48	1.57	2.42		8,323	14,981
				3		18.25	77.42		.87	4.57	90.39	1.64	2.53		8,699	15,658

Winding Gulf No. 1 mine, Beckley bed (face of at; room 14, off left entry 1, off main right heading, 4-foot 4-inch bed, 4-foot 1-inch cut). Same (face of air course of west entry, 4-foot 4-inch bed, 4-foot 1-inch cut). Same (face of main right heading, 4-foot 9-inch bed, 4-foot 5-inch cut). Same (composite of samples 14368, 14369, and 14370). Same (Winding Gulf No. 2 mine, Beckley bed (pillar at break-through to right heading, 4-foot 1-inch bed, 3-foot 9-inch cut). Same (face of left heading 2, 4-foot 11-inch bed, 4-foot 8-inch cut). Same (composite of samples 14372 and 14373).	384	14368	A	1	2.68	17.71	76.62	2.99	45	.....	.....	.....	2.0	.....	.....
				2	.....	18.20	78.73	3.07	46	.....	.....	.....	.....	.....	.....
				3	.....	18.78	81.22	.....	47	.....	.....	.....	.....	.....	.....
				1	2.53	18.68	76.17	2.62	48	.....	.....	.....	1.9	.....	.....
				2	.....	19.17	78.14	2.69	49	.....	.....	.....	.....	.....	.....
				3	.....	19.70	80.30	.....	48	.....	.....	.....	.....	.....	.....
				1	3.38	16.79	76.56	3.27	46	.....	.....	.....	.....	.....	.....
				2	.....	17.38	79.24	3.38	48	.....	.....	.....	.....	.....	.....
				3	.....	17.99	82.01	.....	50	.....	.....	.....	.....	.....	.....
				1	2.87	17.77	76.44	2.92	48	4.65	84.95	1.49	5.51	2.2	8,253
1 mile from; Winding Gulf No. 2 mine, Beckley bed (pillar at break-through to right heading, 4-foot 1-inch bed, 3-foot 9-inch cut). Same (face of left heading 2, 4-foot 11-inch bed, 4-foot 8-inch cut). Same (composite of samples 14372 and 14373).	384	14372	A	2	.....	18.29	78.70	3.01	49	4.46	87.46	1.53	3.05	.....	8,496
				3	.....	18.86	81.14	.....	51	4.60	90.17	1.58	3.14	.....	8,759
				1	1.55	17.86	77.79	2.80	50	.....	.....	.....	.....	.....	.....
				2	.....	18.14	79.02	2.84	51	.....	.....	.....	.....	.....	.....
				3	.....	18.67	81.33	.....	52	.....	.....	.....	.....	.....	.....
				1	2.61	17.27	77.47	2.65	49	.....	.....	.....	.....	.....	.....
				2	.....	17.73	79.55	2.72	50	.....	.....	.....	.....	.....	.....
				3	.....	18.23	81.77	.....	51	.....	.....	.....	.....	.....	.....
				1	2.17	17.39	77.77	2.67	50	4.69	86.28	1.51	4.35	1.4	8,326
				2	.....	17.78	79.43	2.73	51	4.55	88.20	1.54	2.47	.....	8,511
Wood Bay; McAlpin No. 1 mine, Beckley bed (face of second panel, off left heading 3, off second main entry, 3-foot 4½-inch bed and cut). Same (face of second main air course, 5-foot 3-inch bed and cut). Same (face of room 10, second panel, left entry 2, 6-foot 3-inch bed and cut). Same (face of room 3, first panel, left entry 3, 5-foot 3½-inch bed and cut). Same (pillar of main heading 1 between right entries 3 and 4, 4-foot 6½-inch bed, 4-foot 2½-inch cut). Same (face of second panel, off right heading 2, 4-foot 3½-inch bed, 3-foot 11-inch cut). Same (face of fourth panel, off right heading 2, 4-foot 3½-inch bed, 4-foot cut). Same (pillar of air course, near right entry 2, 4-foot 4½-inch bed, 4-foot cut). Same (composite of samples 14301-14308).	385	14301	A	1	1.91	17.51	75.17	5.41	75	4.68	90.68	1.58	2.54	.....	8,750
				2	.....	17.85	76.63	5.52	76	.....	.....	.....	.....	.....	.....
				3	.....	18.89	81.11	.....	80	.....	.....	.....	.....	.....	.....
				1	2.58	17.78	74.64	5.00	53	.....	.....	.....	.....	.....	.....
				2	.....	18.25	76.62	5.13	54	.....	.....	.....	.....	.....	.....
				3	.....	19.24	80.76	.....	57	.....	.....	.....	.....	.....	.....
				1	2.35	17.75	75.55	4.35	60	.....	.....	.....	.....	.....	.....
				2	.....	18.18	77.37	4.45	61	.....	.....	.....	.....	.....	.....
				3	.....	19.03	80.97	.....	64	.....	.....	.....	.....	.....	.....
				1	2.39	18.40	75.66	3.55	62	.....	.....	.....	.....	.....	.....
Same (face of room 3, first panel, left entry 3, 5-foot 3½-inch bed and cut). Same (pillar of main heading 1 between right entries 3 and 4, 4-foot 6½-inch bed, 4-foot 2½-inch cut). Same (face of second panel, off right heading 2, 4-foot 3½-inch bed, 3-foot 11-inch cut). Same (face of fourth panel, off right heading 2, 4-foot 3½-inch bed, 4-foot cut). Same (pillar of air course, near right entry 2, 4-foot 4½-inch bed, 4-foot cut). Same (composite of samples 14301-14308).	385	14304	A	2	.....	18.85	77.51	3.64	64	.....	.....	.....	.....	.....	.....
				3	.....	19.56	80.44	.....	66	.....	.....	.....	.....	.....	.....
				1	2.05	17.96	77.23	2.76	52	.....	.....	.....	.....	.....	.....
				2	.....	18.34	78.84	2.82	53	.....	.....	.....	.....	.....	.....
				3	.....	18.87	81.13	.....	55	.....	.....	.....	.....	.....	.....
				1	1.65	17.80	77.72	2.83	52	.....	.....	.....	.....	.....	.....
				2	.....	18.10	79.02	2.88	53	.....	.....	.....	.....	.....	.....
				3	.....	18.64	81.36	.....	55	.....	.....	.....	.....	.....	.....
				1	1.87	17.73	78.05	2.34	62	.....	.....	.....	.....	.....	.....
				2	.....	18.07	79.55	2.38	63	.....	.....	.....	.....	.....	.....
Same (face of room 3, first panel, left entry 3, 5-foot 3½-inch bed and cut). Same (pillar of main heading 1 between right entries 3 and 4, 4-foot 6½-inch bed, 4-foot 2½-inch cut). Same (face of second panel, off right heading 2, 4-foot 3½-inch bed, 3-foot 11-inch cut). Same (face of fourth panel, off right heading 2, 4-foot 3½-inch bed, 4-foot cut). Same (pillar of air course, near right entry 2, 4-foot 4½-inch bed, 4-foot cut). Same (composite of samples 14301-14308).	385	14307	A	3	.....	18.51	81.49	.....	65	.....	.....	.....	.....	.....	.....
				1	2.26	17.92	77.40	2.42	58	.....	.....	.....	.....	.....	.....
				2	.....	18.33	79.19	2.48	57	.....	.....	.....	.....	.....	.....
				3	.....	18.80	81.20	.....	58	.....	.....	.....	.....	.....	.....
				1	2.20	17.23	77.03	3.52	59	4.01	84.87	1.58	4.83	1.5	8,188
				2	.....	17.62	78.78	3.00	60	4.47	86.78	1.62	2.93	.....	8,372
				3	.....	18.28	81.72	.....	62	4.64	90.02	1.68	3.04	.....	8,684
				1	.....	18.28	81.72	.....	62	.....	.....	.....	.....	.....	.....
				2	.....	18.28	81.72	.....	62	.....	.....	.....	.....	.....	.....
				3	.....	18.28	81.72	.....	62	.....	.....	.....	.....	.....	.....

Table of chemical analyses—Continued.

Mine notes (page).	Locality, bed, etc.	Sample.			Proximate.					Ultimate.					Calorific value.	
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- riss.	British thermal units.
2	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WEST VIRGINIA—Continued.																
RANDOLPH COUNTY.																
386	Mill Creek, 6 miles south of; Tolbert and Spiker mine, Sewell (?) bed (in entry, about 100 feet north of mine mouth, about 40 feet from outcrop, 4-foot bed, 3-foot 7-inch cut).	13561	B	1 2 3	5.03 26.80 30.26	25.45 26.80 61.77	58.67 61.77 69.74	10.85 11.43	.49 .52 .59							
386	Spruce, 5 miles from, and about 9 miles southwest of Cheat Bridge; Hopkins mine, Sewell (?) bed (in mine, 1,075 feet southwest of mine mouth, 4-foot 7-inch bed).	13601	B	1 2 3	2.72 29.51 34.26	28.71 29.51 34.26	55.10 56.64 65.74	13.47 13.85	.96 1.15	4.74 4.56 5.29	73.22 73.27 87.37	1.09 1.12 1.30	6.52 4.21 4.89	1.9	7,192 7,393 8,582	12,946 13,307 15,448
WYOMING.																
CONVERSE COUNTY.																
387	Douglas, 50 miles north of; sec. 33, T. 40 N., R. 72 W., outcrop, Lower Burned bed (6-foot 5-inch bed, 5-foot 7-inch cut).	*11442	B	1 2 3	27.44 42.60 48.22	30.91 42.60 51.78	33.20 45.75 51.78	8.45 11.65	.36 .50					19.6	4,372 6,025 6,820	7,870 10,845 12,276
387	Glenrock, 20 miles north of; sec. 5, T. 37 N., R. 75 W., country bank (face of pit, 12-foot 8-inch bed, 5-foot cut).	*11048	B	1 2 3	28.08 43.98 47.00	31.63 43.98 47.00	35.67 49.60 53.00	6.42 6.42	.45 .63	6.55 4.77 5.10	48.32 67.18 71.79	.69 .96 1.03	39.37 20.04 21.41	14.3	4,639 6,450 6,892	8,350 11,610 12,406
387	Inez, 14 miles south of; sec. 16, T. 33 N., R. 73 W.; Diamond mine (face of entry, 450 feet from mine mouth, 4-foot 8-inch bed and cut).	*14781	B	1 2 3	25.55 43.96 51.90	32.73 43.96 51.90	30.33 40.74 48.10	11.39 15.30	1.25 1.68 1.98					11.2	4,370 5,870 6,930	7,866 10,566 12,474
388	1 mile south of; N.W. 4 sec. 16, T. 33 N. (?), R. 73 W.; Inez mine (at end of entry, 400 feet northwest of end of slope which is 120 feet northeast of mine mouth, 7-foot 8-inch bed, 5-foot 10-inch cut).	*14754	B	1 2 3	27.88 44.51 50.32	31.70 43.95 49.68	31.70 31.70 49.68	8.32 11.54	.71 .98 1.11	6.35 4.51 5.10	45.34 62.87 71.07	.73 1.01 1.14	38.55 19.09 21.58	15.7	4,328 6,001 6,784	7,790 10,802 12,211
388	Lost Spring, 9 miles west of; sec. 11, T. 32 N., R. 69 W.; Fred Haynes prospect (face of main entry, 50 feet from entry mouth).	*10711	B	1 2 3	24.80 43.75 47.43	32.90 43.75 47.43	36.46 48.48 52.57	5.84 7.77	1.18 1.57 1.70					7.6	4,612 6,133 6,649	8,302 11,039 11,968
389	17 miles northeast of; sec. 13, T. 34 N., R. 67 W.; Harney Creek mine (at end of main entry, 50 feet from mouth of entry, 54-foot bed, 4-foot 11-inch cut).	*10911	B	1 2 3	29.87 40.01 44.70	28.06 40.01 44.70	34.71 49.50 55.30	7.36 10.49	.79 1.13 1.26					16.6	4,258 6,071 6,782	7,664 10,928 12,208

389	2 miles northwest of; sec. 36, T. 33 N., R. 68 W.; On-yon mine (room 15, off north entry 1, 1,800 feet from mine mouth).	*10740	B	1	27.91	27.07	36.73	8.29	.89	6.25	47.47	.80	36.30	10.0	4.403	7,927
2				2	37.55	50.95	11.50	1.23	4.37	65.85	1.11	15.94			6,109	10,966
3				3	42.43	57.57	4.28	1.39	4.94	74.40	1.25	18.02			6,903	12,425
389	35 miles north of; sec. 8, T. 37 N., R. 68 W.; prospect, D bed (face of open cut, 4-foot 4-inch bed).	*11447	B	1	27.78	29.38	38.56	5.93	.27					16.8	4,673	8,411
2				2	40.68	53.39	5.93								6,471	11,648
3				3	43.24	56.76									6,870	12,382
390	8 miles north of; sec. 35, T. 34 N., R. 68 W.; Rosin mine (face of left entry 1, about 1,000 feet from the mine mouth, 5-foot 1-inch bed, 4-foot 9-inch cut).	*10775	B	1	27.65	26.70	35.65	9.99	1.03	6.26	45.75	.68	36.29	15.7	5,338	7,808
2				2	36.00	49.29	13.81	1.42	4.42	63.24	.94	16.17			5,996	10,793
3				3	42.81	57.19		1.65	5.13	73.37	1.09	18.76			6,957	12,553
390	8 miles northwest of; Sunset mine (face of main entry, 500 feet from mine mouth, 5-foot 3½-inch bed, 4-foot 8-inch cut).	*10835	B	1	24.04	28.44	34.87	12.65	.61					9.7	4,208	7,682
2				2		37.44	45.91	16.65	.80						5,619	10,114
3				3		44.92	55.08		.96						6,742	12,136
CROOK COUNTY.																
391	Sundance, 7½ miles west of; SE-4 NW-¼ sec. 24, T. 51 N., R. 64 W.; Belshe mine (end of room 150 feet long turned east from back entry, about 275 feet from mine mouth; 5-foot 3½-inch bed, 4-foot 11¼-inch cut).	15713	B	1	20.24	36.35	34.08	9.33	5.25						5,192	9,346
2				2		45.58	42.72	11.70	6.58						6,510	11,718
3				3		51.62	48.38		7.45						7,373	13,271
391	Same (in last crosscut, 48 feet from front entry, crosscut turn 336 feet from mouth of mine, 4-foot 3½-inch bed, 3-foot 6-inch cut).	15714	B	1	19.34	35.35	34.24	11.07	4.38	5.90	51.02	.75	26.88	13.7	5,110	9,198
2				2		43.83	42.45	13.72	5.43	4.65	63.25	.93	12.02		6,342	11,403
3				3		50.80	49.20	16.19	6.29	5.39	73.31	1.08	13.93		7,342	13,216
391	Same (position and bed same as No. 15714, 4-foot 3½-inch cut).	15715	B	1	17.16	34.08	32.57	16.19	5.18					12.4	4,891	8,804
2				2		41.14	39.32	19.54	6.25						5,904	10,627
3				3		51.13	48.87		7.77						7,338	13,208
FREEMONT COUNTY.																
391	Hudson, 1 mile west of; sec. 11, T. 1 S., R. 2 E.; Hickey mine (room 3, off south entry, 300 feet from mine mouth, 3-foot 4-inch bed and cut).	*17247	A	1	23.07	33.07	39.66	4.20	.69	6.22	55.13	1.40	32.36	5.6	5,283	9,509
2				2		42.99	51.55	5.46	.90	4.76	71.66	1.82	13.40		6,867	12,361
3				3		43.47	54.33		.95	5.04	75.80	1.93	16.28		7,264	13,075
392	1½ miles north of; sec. 2, T. 2 S., R. 2 E.; Indian mine (fifth west back entry, one-fourth mile southwest of mine mouth, 6-foot 6-inch bed, 3-foot 6-inch cut).	*13178	B	1	20.88	31.90	39.16	8.06	.51					14.0	5,134	9,241
2				2		40.32	49.49	10.19	.64						6,489	11,680
3				3		44.90	55.10		.71						7,226	13,007
392	Same (in main entry, about 900 feet from mouth of mine, 7-foot bed, 5-foot 6-inch cut).	*13179	B	1	20.39	33.07	40.69	5.85	.58					11.2	5,307	9,553
2				2		41.54	51.11	7.35	.73						6,666	11,999
3				3		44.83	55.17		.79						7,195	12,951
392	Same (face of room 17, off 00 entry, 7-foot 7½-inch bed and cut).	*10838	A	1	22.18	31.85	42.53	3.44	.51					9.2		
2				2		40.93	54.65	4.42	.66							
3				3		42.82	57.18		.69							
392	Same (face of west entry 4, 7-foot 7½-inch bed, 6-foot 3-inch cut).	*10839	A	1	20.98	30.93	43.14	4.95	.44					8.2		
2				2		39.14	54.60	6.26	.56							
3				3		41.75	58.25		.60							
392	Same (in room (about No. 30) off west entry 2, 7-foot 10-inch bed, 7-foot 2-inch cut).	*10840	A	1	21.28	31.15	40.69	6.88	.52					8.0		
2				2		39.57	51.69	8.74	.72							
3				3		43.36	56.64		.73							
392	Same (face of room 4, off east entry 3, 7-foot 2-inch bed, 6-foot 6-inch cut).	*10841	A	1	21.20	29.87	41.72	7.21	.52					8.3		
2				2		37.91	52.94	9.15	.66							
3				3		41.73	58.27		.73							

394	*15219	A	1	16.40	33.78	46.14	3.68	.62				9.0	6,029	10,855
			2	.....	40.41	55.19	4.40	.71					7,212	13,579
			3	.....	42.27	57.73		.77					7,544	13,987
394	*15237	A	1	16.56	33.11	43.49	4.84	.39	6.04	60.64	1.33	26.56	5,926	10,667
			2	.....	39.68	54.32	5.80	.71	5.03	72.68	1.59	14.19	7,402	12,784
			3	.....	42.12	57.88		.58	5.34	77.16	1.69	15.06	7,539	13,570
394	*15201	A	1	16.34	33.29	46.05	3.48	.69				8.6	6,074	10,933
			2	.....	39.79	56.05	4.16	.57					7,260	13,068
			3	.....	41.52	58.48		.72					7,575	13,635
394	*15210	A	1	16.08	33.00	43.86	7.06	.57				10.2	5,789	10,420
			2	.....	39.32	52.27	8.41	.68					6,898	12,416
			3	.....	42.93	57.07		.74					7,531	13,556
394	*15216	A	1	17.07	32.54	45.66	4.73	.53				8.5	5,904	10,627
			2	.....	39.24	55.06	5.70	.64					7,119	12,814
			3	.....	41.61	58.39		.68					7,549	13,588
394	*15218	A	1	16.46	33.87	45.97	3.70	.60				9.2	6,036	10,865
			2	.....	40.54	55.03	4.43	.72					7,225	13,005
			3	.....	42.42	57.58		.75					7,566	13,698
395	*15236	A	1	16.48	32.91	45.83	4.78	.58	5.97	61.08	1.35	26.24	5,972	10,750
			2	.....	39.40	54.88	5.72	.69	4.96	73.13	1.62	13.88	7,150	12,750
			3	.....	41.79	58.21		.73	5.26	77.57	1.72	14.72	7,584	13,651
394	*15214	A	1	17.20	32.31	46.61	3.88	.61				10.2	5,971	10,748
			2	.....	40.94	59.00		.71					7,211	12,980
394	*15215	A	1	17.01	32.54	46.70	3.75	.61					7,566	13,619
			2	.....	39.21	56.27	4.52	.74				9.7	5,970	10,746
			3	.....	41.06	58.94		.78					7,194	12,944
395	*15203	C	1	17.47	32.08	43.41	7.04	.72				11.5	5,635	13,561
			2	.....	38.87	52.60	8.53	.95					6,828	12,290
			3	.....	42.50	57.50		.95					7,465	13,437
395	*15204	C	1	17.30	32.63	43.24	6.83	.70				10.9	5,643	10,157
			2	.....	39.46	52.28	8.26	.85					6,824	12,283
			3	.....	43.01	56.99		.93					7,438	13,388
395	*15205	C	1	17.60	31.82	44.03	6.55	.69				11.5	5,648	10,166
			2	.....	38.62	53.43	7.95	.84					6,854	12,337
			3	.....	41.96	58.04		.91					7,446	13,403
395	*15207	C	1	17.88	32.15	42.46	7.51	.67				12.1	5,580	10,044
			2	.....	39.15	51.71	9.14	.82					6,795	12,231
			3	.....	43.09	56.91		.90					7,479	13,462
395	*15211	C.	1	17.80	31.36	43.18	7.66	.68				11.8	5,589	10,060
			2	.....	38.15	52.53	9.32	.83					6,799	12,238
			3	.....	42.07	57.98		.92					7,498	13,498
395	*15234	C.	1	17.85	31.57	43.37	7.21	.64	6.06	57.70	1.26	27.13	5,610	10,098
			2	.....	38.43	52.79	8.78	.78	4.97	70.24	1.53	13.70	6,829	12,292
			3	.....	42.13	57.87		.86	5.45	77.01	1.68	15.01	7,457	13,477
395	*15206	C.	1	17.75	32.06	44.07	6.12	.70				12.0	5,673	10,211
			2	.....	38.98	53.58	7.44	.85					6,897	12,415
			3	.....	42.11	57.89		.92					7,452	13,414
395	*15208	C.	1	17.81	32.30	41.86	8.03	.70				12.0	5,541	9,974
			2	.....	39.30	50.93	9.77	.85					6,742	12,136
			3	.....	43.56	56.44		.94					7,472	13,450

Table of chemical analyses—Continued.

Mine notes (page).	Sample.			Proximate.					Ultimate.				Air-drying loss.	Calorific value.		
	Laboratory No.	Kind.	Con-dition.	Mois-ture.	Vola-tile mat-ter.	Fixed car-bon.	Ash.	Sul-phur.	Hy-dro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.		Calo-ries.	British thermal units.	
Locality, bed, etc.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WYOMING—Continued.																
HOT SPRINGS COUNTY—continued.																
Crosby, 2 miles from Kirby; sec. 13, T. 44 N., R. 95 W.; Big Horn mine, (Gocho bed) (slack taken from same wagons as sample 15211).	395	*15212	C.	1	17.88	31.52	42.38	8.22	.65					11.7	5,557	10,003
	395	*15235	C.	2	17.87	31.26	43.48	7.39	.66	5.99	57.41	1.28	27.27	11.9	5,590	10,062
	395	*15277	A.	3	16.66	31.88	47.03	4.43	.62	5.35	76.81	1.71	15.25	10.5	6,806	12,251
Kirby, 2 miles from: sec. 11, T. 44 N.; R. 95 W.; Gocho mine, (Gocho bed) (face of east entry 4; 225 feet from butt entry 2; 7-foot 10-inch bed and cut).	396	*15278	A.	2	15.46	33.63	46.43	5.32	.74					7.205	6,005	10,809
	396	*15279	A.	3	15.27	33.64	46.73	4.36	.56	6.06	62.03	1.29	26.29	9.2	6,102	10,984
	396	*15280	A.	3	16.30	33.57	46.95	3.18	.52	5.11	73.72	1.53	14.50	9.2	6,252	13,054
Same (face of east entry 3; 400 feet from butt entry 2; 9-foot 2-inch bed and cut).	396	*15281	A.	2	15.86	33.01	47.39	3.74	.59	6.06	62.03	1.29	26.29	9.2	6,106	10,991
	396	*15282	A.	2	15.86	33.01	47.39	3.74	.59	5.11	73.72	1.53	14.50	9.2	6,252	13,054
	396	*15283	A.	3	16.35	32.93	47.72	3.00	.43	5.35	77.15	1.60	15.17	8.2	7,589	13,660
Same (composite of samples 15277, 15278, 15279, and 15280).	396	*15284	A.	2	17.06	32.10	47.75	3.09	.43					7.316	6,120	11,016
	396	*15285	A.	2	17.06	32.10	47.75	3.09	.43					7.316	6,120	11,016
	396	*15286	A.	3	16.64	39.49	56.00	4.51	.58					7.588	13,169	13,658
Same (barrier pillar between room 1 west side and back entry, off second level, 6-foot 9-inch bed and cut).	396	*15287	A.	2	16.64	39.49	56.00	4.51	.58					10.0	6,043	10,877
	396	*15288	A.	2	16.64	39.49	56.00	4.51	.58					10.0	6,043	10,877
	396	*15289	A.	3	16.64	39.49	56.00	4.51	.58					8.3	7,568	13,622
Same (pillar between west entry 2 and back entry, 375 feet beyond butt entry 3, about 1,750 feet from main slope, 5-foot 9-inch bed and cut).	396	*15290	A.	2	16.64	39.49	56.00	4.51	.58					8.3	7,568	13,622
	396	*15291	A.	3	16.64	39.49	56.00	4.51	.58					8.3	7,568	13,622
	396	*15292	A.	2	16.64	39.49	56.00	4.51	.58					8.3	7,568	13,622

[illegible]

JOHNSON COUNTY.

Buffalo, 18 miles southeast of; prospect, B bed (10-foot 9½-inch bed, 3-foot 4-inch cut).

Casper, 75 miles north of; sec. 23, T. 44 N., R. 81 W.; prospect (6-foot 3-inch bed, 42-inch cut).

60 miles north of; sec. 36, T. 43 N., R. 79 W.; prospect
(13-foot 11-inch bed, 43-inch cut)

405	*15685	A	1	25.41	29.82	40.60	4.17	36	.....	.....	.....	16.0	5,032	9,058		
			2	.....	39.98	54.43	5.59	48	.....	.....	.....	.....	6,746	12,143		
406	*15686	A	3	.....	42.35	57.65	.....	51	.....	.....	.....	.....	7,145	12,861		
			1	24.66	30.81	40.65	3.88	37	6.26	53.23	1.07	35.19	14.0	5,101	9,182	
			2	.....	40.89	53.96	5.15	49	4.67	70.65	1.42	17.62	.....	6,771	12,188	
406	*13498	A	3	.....	43.11	56.89	.....	52	4.92	74.49	1.50	18.57	.....	7,139	12,850	
			2	23.87	30.31	37.60	8.22	123	.....	.....	.....	14.9	.....	.....	.....	
			2	.....	39.81	49.39	10.80	162	.....	.....	.....	.....	.....	.....	.....	
406	*13499	A	3	21.79	31.24	39.46	7.51	98	44.63	55.37	.....	.....	.....	.....	.....	
			2	.....	39.94	50.46	9.60	125	.....	.....	.....	12.6	.....	.....	.....	
406	*13537	A	3	.....	44.18	55.82	.....	138	.....	.....	.....	.....	.....	.....	.....	
			2	22.88	32.51	36.74	7.87	111	6.12	50.50	1.25	33.06	.....	8,998	.....	
			3	.....	42.16	47.63	10.21	144	4.64	65.60	1.62	16.49	.....	6,481	11,666	
407	*16221	A	3	21.88	34.07	35.54	8.51	130	5.17	73.06	1.80	18.37	.....	7,218	12,922	
			2	.....	43.61	45.50	10.89	160	.....	.....	.....	.....	.....	5,049	9,088	
407	*16222	A	3	22.36	33.37	37.70	6.57	95	.....	.....	.....	.....	.....	6,663	13,633	
			2	.....	42.98	48.56	8.46	122	1.86	.....	.....	.....	.....	7,253	13,955	
407	*16223	A	3	.....	46.95	53.05	.....	133	.....	.....	.....	.....	.....	5,131	9,226	
			2	21.88	34.09	36.78	7.25	95	.....	.....	.....	.....	.....	7,220	12,996	
			3	.....	43.64	47.08	9.28	122	1.33	.....	.....	.....	.....	6,009	12,896	
407	*16224	A	3	21.63	33.64	38.29	6.44	92	.....	.....	.....	.....	.....	5,136	9,245	
			2	.....	42.92	48.86	8.22	117	1.34	.....	.....	.....	.....	6,575	11,835	
407	*16225	A	3	23.56	32.32	38.17	5.95	73	.....	.....	.....	.....	.....	7,248	13,046	
			2	.....	46.77	53.23	.....	127	.....	.....	.....	.....	.....	6,635	11,943	
			3	.....	42.28	49.94	7.78	95	.....	.....	.....	.....	.....	7,229	13,012	
407	*16226	A	3	23.38	32.75	37.77	6.10	99						16.6	5,050	9,080
			2	.....	45.85	54.15	.....	103	.....	.....	.....	.....	.....	6,006	11,891	
407	*16227	A	3	.....	42.74	49.30	7.96	129	.....	.....	.....	.....	.....	7,164	12,895	
			2	.....	46.44	53.56	.....	140	.....	.....	.....	.....	.....	6,442	11,956	
407	*16228	A	3	21.74	33.87	37.89	6.50	100	.....	.....	.....	.....	.....	7,217	12,991	
			2	.....	43.28	48.41	8.31	128	.....	.....	.....	.....	.....	5,119	9,214	
407	*16228	A	3	22.52	33.28	37.48	6.72	97	.....	.....	.....	.....	.....	6,541	11,774	
			2	.....	47.20	52.80	.....	140	.....	.....	.....	.....	.....	7,134	12,841	
407	12642	B	3	.....	47.03	52.97	.....	125	.....	.....	.....	.....	.....	5,100	9,180	
			2	24.04	35.17	38.37	4.88	31	6.32	52.33	1.21	32.45	15.0	5,100	9,180	
407	12642	B	3	.....	46.67	46.85	6.48	41	4.93	67.64	1.56	16.05	.....	6,583	11,849	
408	*12641	B	3	.....	49.90	50.10	.....	44	3.40	73.95	1.71	17.57	.....	4,820	8,676	
			2	22.39	35.05	37.50	5.06	35	.....	.....	.....	.....	.....	6,839	12,310	
408	*16060	A	3	.....	45.16	48.32	6.52	71	.....	.....	.....	.....	.....	5,104	9,187	
			2	.....	48.31	51.69	.....	65	.....	.....	.....	.....	.....	6,577	11,839	
408	*16060	A	3	23.96	32.72	37.94	5.38	65	.....	.....	.....	.....	.....	7,035	12,063	
			2	.....	43.03	49.89	7.08	85	.....	.....	.....	.....	.....	5,065	9,117	
408	*16061	A	3	24.02	33.12	38.40	4.46	54	.....	.....	.....	.....	.....	6,661	11,990	
			2	.....	46.31	53.69	.....	91	.....	.....	.....	.....	.....	7,169	12,904	
			3	.....	43.59	50.54	5.87	75	.....	.....	.....	.....	.....	5,099	9,178	
			3	.....	46.31	53.69	.....	.....	.....	.....	.....	.....	.....	6,711	12,880	
			3	.....	43.59	50.54	5.87	75	.....	.....	.....	.....	.....	7,130	12,834	

Same (face of room 9, off north entry 4, off west entry 1, 65 feet from north entry 4, 10-foot 5-inch bed and cut).

Same (composite of samples 15677-15685; includes samples from No. 1 mine).

Dietz; sec. 34, T. 57 N., R. 84 W.; Dietz No. 4 mine, Dietz No. 2 (?) bed (face of room 3, off west entry 4, 8-foot 5½-inch bed and cut).

Same (face of room 1, off west entry 12, off main north entry, 7-foot 8-inch bed and cut).

Same (composite of samples 13498 and 13499).....

Same (face of room 9, off west entry 6, off north entry 6, 7-foot 4-inch bed and cut).

Same (face of room 2, off west entry 12, off north entry 4, 7-foot 7-inch bed and cut).

Same (face of north entry 4, off west entry 4, 7-foot 3-inch bed and cut).

Same (face of room 10, off east entry 5, off main north entry, 7-foot 5-inch bed and cut).

Same (face of main north entry, 7-foot 1-inch bed and cut.)

Same (on pillar in room 9, off east entry 14, 8-foot 7-inch bed and cut).

Same (face of main entry, 150 feet from mine mouth, 6-foot 1-inch bed and cut).

Same (composite of samples 16221-16227)

Kooi, 1½ miles south of; sec. 27, T. 57 N., R. 85 W.; Hughey prospect, Monarch (?) bed, 4-foot bed.

NW ¼ sec. 23, T. 57 N., R. 85 W.; Kooi mine; Carney (?) (Monarch) bed (in east entry, 2,100 feet from mine mouth, 23-foot bed, 9-foot cut).

Same (face of room 20, off fifth east entry, first panel, 7-foot 11-inch cut).

Same (face of room 9, off fifth east entry, fourth panel, 9-foot cut).

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.			Proximate.				Ultimate.					Calorific value.			
		Laboratory No.	Kind.	Con- di- tion.	Mois- ture.	Volu- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.	Nitro- gen.	Oxy- gen.	Air- dry- ing loss.	Calo- ries.	British thermal units.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
WYOMING—Continued.																	
SHERIDAN COUNTY—Continued.																	
Kooi, NW. $\frac{1}{4}$ sec. 23, T. 57 N., R. 85 W.; Kooi mine; Car- ney (?) (Monarch) bed (face of fifth east entry, 1,900 feet from the main slope, 7-foot 11-inch cut).	408	*16062	A	1 2 3	23.07	33.50 43.55 46.35	38.78 50.41 53.65	4.45 6.04 .....	.....	60 78 83	.....	.....	.....	11.9	5,182 6,786 7,169	9,328 12,125 12,904	
	408	*16063	A	1 2 3	23.02	33.76 43.85 46.47	38.88 50.51 53.53	4.34 5.64	64 83 88	.....	.....	.....	.....	7.2	5,192 6,744 7,147	9,346 12,139 12,865	
	408	*16064	A	1 2 3	23.66	32.49 42.56 45.05	39.62 51.90 54.95	4.23 5.54	48 63 67	.....	.....	.....	.....	10.0	5,009 6,679 7,070	9,178 12,622 12,726	
Same (face of room 7, off tenth east entry, second panel, 8-foot 4-inch cut).	408	*16065	A	1 2 3	22.14	31.29 41.04 48.57	37.82 48.57 52.45	5.75 7.39	1.00 1.28 1.38	.....	.....	.....	8.4	5,133 6,593 7,119	9,239 11,807 12,814		
	408	*16066	A	1 2 3	23.64	32.98 43.19 46.05	38.64 50.60 53.95	4.74 6.21	86	66 ..... .....	.....	.....	8.9	5,084 6,658 7,099	9,151 11,984 12,778		
	408	*16067	A	1 2 3	23.35	33.86 44.17 47.06	38.08 49.69 52.94	4.71 6.14	92 83 88	64 83 88	6.30 4.84 5.16	53.10 69.27 73.80	1.25 1.63 1.74	34.00 17.29 18.42	10.3 10.8	5,116 6,674 7,110	9,269 12,013 12,798
Same (face of room 9, off fifth west entry, off main entry, 8-foot 5-inch cut).	408	*16818	A	1 2 3	23.60	32.12 42.04 45.04	39.19 51.30 54.96	5.09 6.66	57 75 80	.....	.....	.....	.....	.....	.....	.....	
	408	*16819	A	1 2 3	24.60	30.63 40.62 43.37	39.99 53.04 56.63	4.78 6.34	53 70 75	.....	.....	.....	.....	12.4	.....	.....	
	408	*16820	A	1 2 3	23.84	31.99 42.00 44.96	39.16 51.42 55.04	5.01 6.58	50 63 67	48 63 67	.....	.....	.....	11.4	.....	.....	
Same (face of room 3, off seventh west entry, 8-foot $9\frac{1}{2}$ -inch cut).	408	*16821	A	1 2 3	22.71	32.27 41.75 44.68	39.96 51.70 55.32	5.06 6.55	59 76 81	59 76 81	.....	.....	.....	9.6	.....	.....	
	408	*16822	A	1 2 3	23.49	31.22 40.80 43.59	40.40 52.81 56.41	4.89 6.39	50 65 69	65 81 84	6.57 5.18 5.53	52.00 67.96 72.60	.96 1.25 1.34	35.08 18.57 9.84	11.1	5,067 6,623 7,075	9,121 11,921 12,735

	409	12005	A	1	2	3	22.25	35.01	39.01	3.73	37	6.27	55.28	1.07	33.28	11.1	5.343	9.617
Monarch; Monarch mine, Monarch bed (pillar of butt entry 3, off west entry 9, near room 70, 7-foot 10-inch cut).	409	*12008	A	2	3	2	45.03	45.03	50.17	4.80	50	4.89	71.10	1.38	17.35	.....	6.872	12.370
Same (pillar of west entry 9, near room 70, 8-foot 2-inch cut).	409			1	2	3	23.05	31.89	41.83	3.23	37	6.04	54.05	1.10	34.21	9.5	5.269	9.484
				2	3	2	41.44	41.44	54.36	4.20	48	5.04	71.02	1.43	17.83	.....	6.847	12.325
				3	2	3	43.26	43.26	56.74	.....	50	5.26	74.13	1.49	18.02	.....	7.147	12.865
Same (face of room 70, near west entry 7, 8-foot 2-inch cut).	409	*12006	A	1	2	3	23.41	33.55	39.44	3.60	39	6.42	54.38	1.03	34.18	10.0	5.218	9.392
				2	3	2	43.81	43.81	51.49	4.70	51	4.99	71.00	1.34	17.46	.....	6.813	12.263
				3	2	3	45.97	45.97	54.03	.....	54	5.24	74.50	1.41	18.31	.....	7.149	12.868
West of; SE. $\frac{1}{4}$ sec. 24, T. 57 N., R. 85 W.; New Monarch mine, Monarch bed (800 feet southwest of mine mouth, 10-foot cut).	409	*12685	B	1	2	3	23.88	34.33	38.44	3.35	38	6.29	54.07	1.14	17.79	8.1	5.186	9.335
Same (face of east entry 6, 250 feet from main haulage slope, 9-foot 2-inch cut).	409	*15830	A	2	3	2	45.10	45.10	50.50	4.40	50	4.78	71.03	1.50	17.79	.....	6.813	12.263
				3	2	3	47.17	47.17	52.83	.....	52	5.00	74.30	1.57	18.61	.....	7.126	12.827
Same (face of west entry 8, 9-foot 4-inch cut).....	409	*15831	A	1	2	3	22.56	34.36	38.74	4.34	44	.....	.....	.....	.....	15.9	5.139	9.250
				2	3	2	43.19	43.19	51.81	4.58	61	.....	.....	.....	.....	.....	6.822	12.280
				3	2	3	45.19	45.19	54.81	.....	61	.....	.....	.....	.....	14.0	7.149	12.808
Same (face of west entry 8, 9-foot 4-inch cut).....	410	*15832	A	1	2	3	22.78	33.21	40.64	3.37	32	.....	.....	.....	.....	.....	5.214	9.385
				2	3	2	43.01	43.01	52.63	4.36	41	.....	.....	.....	.....	.....	6.840	12.312
				3	2	3	44.97	44.97	53.03	.....	43	.....	.....	.....	.....	.....	7.152	12.874
Same (in west entry 4, opposite fifth and sixth butts, 800 feet from haulage way, 10 foot 1-inch cut).	410	*15833	A	1	2	3	22.26	34.79	38.81	4.14	44	.....	.....	.....	.....	.....	5.285	9.513
				2	3	2	44.75	44.75	49.92	5.33	57	.....	.....	.....	.....	.....	6.798	12.236
				3	2	3	47.27	47.27	52.73	.....	60	.....	.....	.....	.....	.....	7.181	12.926
Same (face of room 8, off butt entry 4, off west entry 4, 10-foot 4-inch cut).	410	*15834	A	1	2	3	24.31	32.99	38.76	3.94	49	.....	.....	.....	.....	.....	5.143	9.257
				2	3	2	43.59	43.59	51.20	5.21	65	.....	.....	.....	.....	.....	6.795	12.231
				3	2	3	45.99	45.99	54.01	.....	69	.....	.....	.....	.....	.....	7.169	12.904
Same (pillar between rooms 24 and 25, off west entry 12, 9-foot cut).	410	*15835	A	1	2	3	22.46	34.16	39.54	3.84	49	.....	.....	.....	.....	.....	5.280	9.504
				2	3	2	44.06	44.06	50.99	4.95	63	.....	.....	.....	.....	.....	6.810	12.258
				3	2	3	46.36	46.36	53.64	.....	66	.....	.....	.....	.....	.....	7.165	12.897
Same (pillar between rooms 5 and 6, off butt entry 2, off west entry 3, 9-foot 9-inch cut).	410	*15836	A	1	2	3	22.42	34.17	39.58	3.83	49	.....	.....	.....	.....	.....	5.296	9.533
				2	3	2	44.05	44.05	51.01	4.94	63	.....	.....	.....	.....	.....	6.827	12.289
				3	2	3	46.34	46.34	53.66	.....	66	.....	.....	.....	.....	.....	7.182	12.928
Same (composite of samples 15830-15836).....	410	*15837	A	1	2	3	23.24	33.01	39.88	3.87	46	6.20	54.33	1.00	33.90	13.7	5.219	9.904
				2	3	2	43.01	43.01	51.95	5.04	63	4.83	70.78	1.42	17.33	.....	6.769	12.238
				3	2	3	45.29	45.29	54.71	.....	63	5.09	74.54	1.50	18.24	.....	7.160	12.888
New Acme; sec. 22, T. 57 N., R. 84 W.; New Acme mine, Monarch bed (face of west entry 7, 150 feet from main slope, 6-foot 8-inch cut).	410	*16055	A	1	2	3	23.66	31.75	41.66	2.93	41	.....	.....	.....	.....	.....	5.257	9.463
Same (face of room 4, off east entry 5, 7-foot 2-inch cut).	410	*16056	A	1	2	3	21.71	33.51	40.80	3.98	56	.....	.....	.....	.....	.....	6.886	12.395
				2	3	2	42.80	42.80	52.12	5.08	60	.....	.....	.....	.....	.....	7.181	12.890
				3	2	3	43.09	43.09	54.57	.....	56	.....	.....	.....	.....	.....	8.407	9.733
Same (face of room 13, off east entry 3, 7-foot 7-inch cut).	410	*16057	A	1	2	3	24.29	33.49	38.68	3.54	58	.....	.....	.....	.....	.....	5.244	9.439
				2	3	2	44.23	44.23	51.09	4.68	77	.....	.....	.....	.....	.....	6.926	12.467
				3	2	3	46.40	46.40	53.60	.....	81	.....	.....	.....	.....	.....	7.266	13.079
Same (face of room 11, off east entry 2, 6-foot 9-inch cut).	410	*16058	A	1	2	3	24.24	31.44	41.55	2.77	43	.....	.....	.....	.....	.....	5.218	9.392
				2	3	2	41.50	41.50	54.84	3.66	57	.....	.....	.....	.....	.....	6.888	12.398
				3	2	3	43.08	43.08	56.92	.....	59	.....	.....	.....	.....	.....	7.150	12.870
Same (composite of samples 16055-16058).....	410	*16059	A	1	2	3	23.30	32.05	41.34	3.31	53	6.35	54.96	1.01	33.54	9.2	5.296	9.533
				2	3	2	41.79	41.79	53.89	4.32	69	4.90	71.66	1.32	17.11	.....	6.905	12.429
				3	2	3	43.67	43.67	56.33	.....	72	5.12	74.89	1.38	17.89	.....	7.216	12.959

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.		Proximate.				Ultimate.				Air-drying loss.	Calorific value.			
		Laboratory No.	Kind.	Condi- tion.	Mois- ture.	Vola- tile mat- ter.	Fixed car- bon.	Ash.	Sul- phur.	Hy- dro- gen.	Car- bon.		Nitro- gen.	Oxy- gen.	Calo- ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WYOMING—Continued.																
SWEETWATER COUNTY.																
Gunn, 4 miles from Baxter Junction; sec. 8, T. 19 N., R. 104 W.; B mine, No. 11 bed (face of room 15, off entry 5, 6-foot 2-inch bed).	411	11507	A	1	17.37	33.89	46.76	1.98	.92					13.3		
				2		41.01	56.59	2.40	1.11							
				3		42.02	57.98		1.14							
Same (face of room 25, off entry 4, 6-foot 1-inch bed).	411	11508	A	1	15.79	33.96	48.27	1.98	.79					11.5		
				2		40.33	57.32	2.35	.94							
				3		41.30	58.70		.96							
Same (face of room 8, off entry 8, 6-foot 2-inch bed).	411	11509	A	1	16.03	31.65	47.16	2.16	.95					11.8		
				2		41.26	56.17	2.57	1.13							
				3		42.35	57.65		1.16							
Same (composite of samples 11507, 11508, 11509).	411	11510	A	1	16.32	34.86	46.77	2.05	.87	6.15	63.61	1.33	25.99	12.2	6,196	11,153
				2		41.66	55.89	2.45	1.04	5.19	76.01	1.59	13.72		7,401	13,327
				3		42.71	57.29		1.07	5.32	77.92	1.63	14.06		7,590	13,662
Superior; sec. 29, T. 21 N., R. 102 W.; B mine, No. 7 bed (room 27, off inside dip entry, 7-foot 2-inch bed and cut).	412	11461	A	1	11.07	37.49	47.63	3.51	1.03					7.4		
				2		42.16	53.89	3.95	1.16							
				3		43.89	56.11		1.21							
Same (face of south entry 2, 7-foot 4½-inch 1 bed and cut).	412	11462	A	1	12.65	36.61	47.29	3.45	1.01					8.6		
				2		41.91	54.14	3.95	1.16							
				3		43.63	56.37		1.21							
Same (face of room 20, off south entry 3, 7-foot 3½-inch 1 bed and cut).	412	11463	A	1	11.74	37.15	47.32	3.59	.89					7.1		
				2		42.09	53.84	4.07	.91							
				3		43.87	56.13		.95							
Same (room 11, off north entry 3, 6-foot 3½-inch 1 bed and cut).	412	11464	A	1	11.64	37.86	47.24	3.26	.86					7.0		
				2		42.85	53.46	3.69	.97							
				3		44.49	55.51		1.01							
Same (composite of samples 11461-11464).	412	11465	A	1	11.79	36.96	47.88	3.37	.99	5.90	67.87	1.44	20.43	7.5	6,006	11,969
				2		41.90	54.28	3.82	1.12	5.20	76.94	1.63	11.29		7,557	13,603
				3		43.56	56.44		1.16	5.41	79.99	1.69	11.75	9.0	7,857	14,143
Sec. 21, T. 21 N., R. 101 W.; Superior C mine, No. 1 bed (room 15, off south entry 6, 8-foot 7½-inch bed, 8-foot 6-inch cut).	412	11456	A	1	12.53	36.22	47.36	3.89	1.05							
				2		41.41	54.14	4.45	1.20							
				3		43.34	56.66		1.26							

Table of chemical analyses—Continued.

Locality, bed, etc.	Mine notes (page).	Sample.		Proximate.				Ultimate.						Calorific value.		
		Laboratory No.	Kind.	Con-dition.	Mois-ture.	Vola-tile mat-ter.	Fixed car-bon.	Ash.	Sul-phur.	Hy-dro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.	Air-dry-ing loss.	Calo-ries.	British thermal units.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
WYOMING—Continued.																
WESTON COUNTY.																
Cambria, 6½ miles from Newcastle; sec. 20, T. 46 N., R. 61 W.; Antelope No. 4 mine (face of east entry 1, 3-foot 11-inch bed, 2-foot 11-inch cut). Same (face of north entry 1, off east entry 1; 6-foot 1-inch bed, 5-foot 3-inch cut).	415	16,412	A	1	10.97	38.25	33.30	17.48	4.80	.....	.....	.....	.....	8.5	5,508	9,914
				2	.....	42.96	37.41	19.63	5.39	.....	.....	.....	.....	.....	6,187	11,137
	415	16413	A	1	10.35	39.75	34.65	15.25	4.99	.....	.....	.....	.....	7.6	5,725	10,305
				2	.....	41.34	38.65	17.01	5.57	.....	.....	.....	.....	.....	6,386	11,495
	415	16414	A	1	10.84	38.90	37.73	12.44	5.07	.....	.....	.....	.....	8.2	7,695	13,851
Same (face of room 29 off east entry 3, 8-foot 11-inch bed, 6-foot 2-inch cut).				2	.....	43.73	42.32	13.95	5.69	.....	.....	.....	.....	.....	5,969	10,744
				3	.....	50.82	49.18	15.03	6.66	.....	.....	.....	.....	.....	6,995	12,051
	415	16415	A	1	10.77	39.10	35.10	15.03	4.87	5.46	56.09	74	17.81	8.1	7,745	10,341
Sec. 19, T. 46 N., R. 61 W.; Antelope No. 3 mine (face of room 35, off east entry 5; 3-foot 9-inch bed and cut).				2	.....	43.82	39.34	16.84	5.46	4.77	62.86	83	9.24	.....	6,438	11,588
	415	16428	A	1	11.88	37.32	34.64	16.16	6.57	5.74	75.59	1.00	11.10	.....	7,742	13,936
				2	.....	52.69	47.31	16.16	6.57	.....	.....	.....	.....	9.2	5,573	10,631
Same (face of west entry 8, 7-foot 3-inch bed, 6-foot 6-inch cut).				3	.....	51.86	48.14	15.45	6.49	.....	.....	.....	.....	.....	6,324	11,383
	415	16429	A	1	9.52	40.79	34.24	15.45	4.98	5.837	10.507	7.4	13,959	7.2	5,837	10,507
				2	.....	45.08	37.84	17.08	5.50	5.61	11,612	6.2	7,780	6.2	5,676	10,217
Same (face of west entry 7, 7-foot 5-inch bed, 6-foot 11-inch cut).				3	.....	54.37	45.63	17.96	6.63	.....	.....	.....	.....	.....	7,780	14,004
	415	16430	A	1	8.92	38.41	34.71	17.96	4.92	.....	.....	.....	.....	6.2	5,676	10,217
				2	.....	42.17	38.11	19.72	5.40	.....	.....	.....	.....	.....	6,232	11,218
Same (composite of samples 16428, 16429, and 16430).				3	.....	52.53	47.47	16.56	6.73	.....	.....	.....	.....	.....	7,763	13,973
	415	16431	A	1	10.00	39.11	34.33	16.56	4.90	5.36	55.21	68	17.29	7.5	5,693	10,247
				2	.....	43.46	38.14	18.40	5.44	4.72	61.34	76	9.34	.....	6,325	11,385
Moorcroft, 12 miles south of, 15 miles northwest of Upton; SE. ¼ sec. 29, T. 48 N., R. 67 W.; prospect (face of entry, 100 feet north of mine mouth; 3-foot bed, 2-foot 11-inch cut).				3	.....	53.26	46.74	18.40	6.67	5.78	75.17	93	11.45	.....	7,751	13,952
	416	*12446	B	1	26.08	31.05	36.86	6.01	5.56	6.26	49.36	91	36.90	14.0	4,647	8,365
				2	.....	42.00	49.87	8.13	7.76	4.55	66.77	1.23	18.56	.....	6,286	11,315
12 miles southwest of; sec. 29, T. 48 N., R. 68 W.; prospect (2½-inch bed and cut).				3	.....	45.72	54.28	8.13	.83	4.95	72.68	1.34	20.20	.....	6,542	12,316
																
	416	*12392	B	1	29.97	28.77	34.52	6.74	.92	.....	.....	.....	.....	17.2	4,279	7,702
			2	.....	41.08	49.30	9.62	1.31	.....	.....	.....	.....	.....	6,110	10,998	
			3	.....	45.45	54.55	.....	.....	1.45	.....	.....	.....	.....	.....	6,760	12,168

DESCRIPTIONS OF SAMPLES.

ALABAMA.

JEFFERSON COUNTY.

LITTLETON. BANNER MINE.

Sample.—Bituminous coal; Warrior field; analyses Nos. 12083, 12084, 12085, and 12086 (p. 17).

Mine.—Banner, a shaft (originally a slope) mine near Littleton, about 20 miles northwest of Birmingham, on the Cane Creek division of the Louisville & Nashville Railroad.

Coal bed.—Big or Mary Lee. Carboniferous age, Pottsville group. This same bed is worked at Palos, Ala. Thickness about 10 feet. The bed is practically horizontal, the dip being 1 to 2 per cent. The bed is overlain by sandstone and the floor is shale. Near the center of the bed is a stratum of hard gray shale 18 to 22 inches thick, known as "middleman." The bed was measured and sampled at three points in the mine by J. J. Rutledge, on April 26, 1911, as described below:

Sections of coal bed in Banner mine.

Section.....	A	B	C
Laboratory No.....	12083	12084	12085
Roof, sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 2	1 4	1 2
Shale, gray.....	a0 1	a0 1	a0 1
Coal.....	0 8	0 8	0 7
Shale, hard, gray.....	.. ..	a0 8	a0 10
Coal.....	1 8	1 4	1 9
"Sulphur".....	.. ..	a0 1	.. ..
Coal.....	.. ..	0 4	.. ..
"Sulphur" ("slate").....	a0 1	a0 1	a0 1
Coal.....	0 6	0 6	0 6
Shale, hard, gray.....	a1 6	a1 9	a1 9
Coal.....	2 3	2 7	2 7
Shale, gray.....	0 1	a0 2	0 1
Coal.....	0 7½	0 9	0 7
Floor, shale.....			
Thickness of bed.....	8 7½	10 4	10 0
Thickness of coal sampled.....	6 11½	7 6	7 4

a Not included in sample.

Section A (sample 12083) was cut from the rib near the mouth of room 4, off right entry 5, 2,000 feet east of shaft No. 1.

Section B (sample 12084) was cut from the rib near the mouth of room 2, off left entry 8, 2,400 feet east of shaft No. 1.

Section C (sample 12085) was cut from the right rib of the main slope, at the mouth of left entry 9, 2,700 feet east of shaft No. 1.

A composite sample was made by combining face samples 12083, 12084, and 12085. The results of an ultimate analysis of this sample are given under Laboratory No. 12086.

Notes.—The room-and-pillar system of mining is used. At the time of sampling the coal was undercut by electric chain machines and shot down with a permissible explosive. The output was about 1,000 tons a day, all of which was from advance workings. In advance workings, about 40 per cent of the coal was taken out.

For a description of the geologic relations of this coal bed, see U. S. Geol. Survey Bull. 285, 1906, p. 216.

MORRIS. INDIO MINE.

Sample.—Bituminous coal; Warrior field; analyses Nos. 16683, 16684, 16685, 16686, and 16687 (p. 17).

Mine.—The Indio mine is opened by a shaft 186 feet deep, and is 4 miles east of Morris, on the Louisville & Nashville Railroad.

Coal bed.—Jefferson. Carboniferous age, Black Creek formation. Thickness, 4 feet to 4 feet 8 inches. The bed lies practically horizontal and has two characteristic shale partings, one near the bottom and one near the top. Roof, shale, with a sandstone cap rock. The shale occasionally came down with the coal and particles of the roof got mixed with the coal in loading. The floor is a hard, smooth shale, particles of which did not get mixed with the coal in mining.

The bed was measured and sampled at four points in the mine by E. B. Sutton and J. W. Webb, on March 28, 1913, as described below:

Sections of coal bed in Indio mine.

Sections.....	A		B		C		D	
Laboratory No.....	16683		16684		16685		16686	
Roof, shale.....	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Coal.....	0	7	0	8	0	8½	0	8½
Shale.....	a0	2	a0	3	a0	5	a0	3½
Coal.....	1	6	1	7	1	2	1	3½
Shale.....	a1	8	a1	8	a1	3	a1	2½
Coal.....	0	6	0	6	0	6	0	7
Floor, shale.....								
Thickness of bed.....	4	5	4	8	4	½	4	1
Thickness of coal sampled.....	2	7	2	9	2	4½	2	7

aNot included in sample.

Section A (sample 16683) was measured at the face of room 7, off the fifth left south entry.

Section B (sample 16684) was measured at the face of room 4, off the seventh right north entry.

Section C (sample 16685) was measured at the neck of room 4, off the sixth right south entry.

Section D (sample 16686) was measured at the intersection of the main south air course and the sixth left south entry.

A composite sample was made by combining face samples 16683 to 16686, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 16687.

Notes.—At the time the mine was visited the coal was shot off the solid with permissible explosives. Black powder was used for brushing the floor and roof. The coal was all shipped as run-of-mine. The average daily output was 275 tons. There was about 100 acres to be mined from this opening.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 285, 1906, p. 219.

ST. CLAIR COUNTY.

COAL CITY. COAL BRANCH MINE.

Sample.—Bituminous coal; Coosa Basin field; analyses Nos. 12440, 12441, 12442, and 12443 (p. 18).

Mine.—Coal Branch, a slope mine at Coal City, on the Seaboard Air Line Railway.

Coal bed.—Coal City. Carboniferous age, Pottsville group. Thickness, 2 feet 10 inches to 5 feet; roof, weak calcareous shale; floor, hard shale.

The bed was measured and sampled at three points in the mine by Charles Butts on July 21, 1911, as described below:

Section of coal bed in Coal Branch mine.

Section.....	A	B	C
Laboratory No.....	12440	12441	12442
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	4 10	3 10	2 10
"Rash".....	a 0 2		
Floor, shale, hard.....			
Thickness of bed.....	5 0	3 10	2 10
Thickness of coal sampled.....	4 10	3 10	2 10

a Not included in sample.

Section A (sample 12440) was measured in the first left room off twenty-sixth entry, 3,000 feet north of the slope mouth.

Section B (sample 12441) was measured at the end of thirty-fourth entry, 2,800 feet north of the slope mouth.

Section C (sample 12442) was measured at the end of room 32, 3,000 feet northeast of the slope mouth.

A composite sample was made by combining face samples 12440, 12441, and 12442. The results of an ultimate analysis of this sample are shown under laboratory No. 12443.

COAL CITY. VULCAN No. 4 MINE.

Sample.—Bituminous coal; Coosa Basin field; analyses Nos. 12436, 12437, 12438, 12439 (p. 18).

Mine.—Vulcan No. 4; a slope mine at Coal City, on the Seaboard Air Line Railway.

Coal bed.—Broken Arrow. Carboniferous age, Pottsville group. Thickness, 3 feet 6 inches to 4 feet 9 inches.

The bed was measured and sampled at three points in the mine by Charles Butts on July 21, 1911, as described below:

Section of coal bed in Vulcan No. 4 mine.

Section.....	A	B	C
Laboratory No.....	12436	12437	12438
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bony.....	a 0 3	a 0 5	a 0 4
Clay.....	a 0 3½	a 0 5	a 0 3½
Coal, bony.....	a 0 3½	a 0 3	a 0 3
Coal, hard.....	1 ..	0 10	0 9
Coal, soft.....	1 6	1 10	1 10
Coal, rashy, "mining".....	0 9½	1 0	0 10
Floor, shale.....			
Thickness of bed.....	4 1½	4 9	4 3½
Thickness of coal sampled.....	3 3½	3 8	3 5

a Not included in sample.

Section A (sample 12436) was measured in room 21, off second left heading, 750 feet southeast of the mine mouth.

Section B (sample 12437) was measured 1,100 feet east of the mine mouth.

Section C (sample 12438) was measured in room 15, off second left heading, 600 feet south of the mine mouth.

A composite sample was made by combining face samples 12436, 12437, and 12438. The results of an ultimate analysis of this sample are shown under laboratory No. 12439.

SHELBY COUNTY.

STRAVEN. STRAVEN MINE.

Sample.—Bituminous coal; Cahaba field; analyses Nos. 14391 and 14392 (p. 18).

Mine.—Straven, a slope mine in sec. 7, T. 21 S., R. 3 W., at Straven, on the Mobile branch of the Southern Railway.

Coal bed.—Upper Straven. Carboniferous age, Pottsville group. Thickness, 5 feet 6½ inches.

The bed was measured and sampled at one point in the mine by Charles Butts on June 14, 1912, as described below:

Section of coal bed in Straven mine.

Laboratory No.	{ 14391
Roof, shale.	{ 14392
Coal, rash, and shale	<i>Ft. in.</i>
Coal, hard	a 0 8
Parting (knife edge to 4 inches of rash or soft coal)	b 0 10½
Coal	b 2 2
Clay	a 0 8½
Coal, softer than upper bench	c 1 1½
Floor, clay:	
Thickness of bed	4 4½

a Excluded from samples.

b Included in sample 14391.

c Included in sample 14392.

The section was measured near the end of the slope, 2,000 feet north of the slope mouth.

Notes.—The coal was hard and bright. At the time of sampling, the coal was sold as run-of-mine for domestic and steam purposes.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 39, 351.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 431, 1909, p. 140.

TUSCALOOSA COUNTY.

ABERNANT. ABERNANT MINE.

Sample.—Bituminous coal; Warrior field; analysis No. 14717 (p. 19).

Mine.—Abernant, a slope mine in sec. 18, T. 20 S, R. 6 W., at Abernant, seven-eighths of a mile south of Yolande.

Coal bed.—Jagger. Carboniferous age, Pottsville group. Thickness of coal mined, 6 to 7 feet; dip, 14° NW. The coal has no cleat, but has several shale partings. Roof-shale, which sometimes comes down and gets mixed with the coal in mining; above the shale is a sandstone cap rock. Floor, hard blue sandstone, which did not mix with the coal in loading.

The bed was measured and sampled at one point in the mine by E. B. Sutton on August 15, 1912, as described below:

Section of coal bed in Abernant mine.

Laboratory No.	14717
Roof, sandstone.	<i>Ft. in.</i>
Bone	a 0 1½
Coal	0 8
Mother coal	a 0 1
Coal	0 5
Shale	a 0 3
Coal	1 0
Shale	a 0 1
Coal	0 11
Shale	a 0 1
Coal	1 8
Shale	a 0 4
Coal	0 2
Shale	a 0 2
Coal	0 8
Floor, sandstone.	
Thickness of bed	6 7½
Thickness of coal sampled	5 6

a Not included in sample.

Section A (sample 14717) was measured at the face of right entry 13.

Notes.—At the time the mine was sampled the coal was undercut by hand and blasted down with a permissible explosive. The tippie was a wooden structure. All coal was shipped as run-of-mine. Two men were employed to trim the coal and pick "slate" from the cars. The average daily output was 300 tons a day, with a capacity of 500 tons.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 39, 352.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 260, 1905, p. 375, and Bull. 400, 1910, p. 170.

ALASKA.

ALASKA PENINSULA.

CHIGNIK BAY. WARNER CLAIM.

Sample.—Bituminous coal; Alaska Peninsula field; analysis No. 12742 (p. 19).

Mine.—Warner claim, Chignik Bay.

Coal bed.—Not named. Cretaceous age, Chignik (?) formation.

Notes.—Sample 12742 was taken at the Warner claim on November 1, 1911. No further information available.

The coal beds of the Chignik Bay region are described in U. S. Geol. Survey Bull. 467, 1911, p. 109.

BERING RIVER.

BARRETT CREEK. CUNNINGHAM CLAIMS.

Sample.—Semibituminous coal; Bering River field; analysis No. 12716 (p. 19).

Locality.—Cunningham claims, on Barrett Creek.

Coal bed.—Unnamed. Tertiary age, Kushtaka formation. Thickness, about 5 feet. A number of beds outcrop on this creek.

Notes.—The bed was sampled on November 4, 1911. The sample was taken at an outcrop on Barrett Creek, three-fourths of a mile above its junction with Clear Creek. The bed was about 5 feet thick at this point.

For a description of the geologic relations of this coal bed, see Report on Coal in Alaska for Use in United States Navy: House Document No. 876, 1914, p. 38.

BARRETT CREEK. CUNNINGHAM CLAIMS.

Sample.—Semibituminous coal; Bering River field; analysis No. 12709 (p. 19).

Locality.—Cunningham claims, Barrett Creek.

Coal bed.—Unnamed. Tertiary age, Kushtaka formation. Thickness about 2 feet. This bed lies above the bed represented by sample 12716.

Notes.—The bed was sampled at one point on November 3, 1911. The sample was taken at a point about 100 feet up the creek, measured across the dip, from the place where sample 12716 was taken. The bed was about 2 feet thick at the point sampled.

For a description of the geologic relations of this coal bed, see Report on Coal in Alaska for Use in United States Navy: House Document No. 876, 1914, p. 38.

BARRETT CREEK. CUNNINGHAM CLAIMS.

Sample.—Semibituminous coal; Bering River field; analysis No. 12707 (p. 19).

Locality.—Cunningham claims on Barrett Creek.

Coal bed.—Unnamed bed. Tertiary age, Kushtaka formation. The bed outcrops above the one represented by sample 12709.

Notes.—The bed was sampled at one point on November 3, 1911. The sample was taken at a point 15 to 20 feet, measured across the strike, above the bed represented by sample 12709.

For a description of the geologic relations of this coal bed see Report on Coal in Alaska for Use in United States Navy: House Document No. 876, 1914, p. 38.

BARRETT CREEK. CUNNINGHAM CLAIMS.

Sample.—Semibituminous coal; Bering River field; analysis No. 12708 (p. 19).

Location.—Cunningham claims on Barrett Creek.

Coal bed.—Unnamed. Tertiary age, Kushtaka formation. The bed lies between the beds represented by samples 12707 and 12714.

Notes.—The bed was sampled at one point on November 3, 1911. The sample was taken from an outcrop on the creek, at a point between the third and fifth seams, about 350 feet, measured along the creek, or between 100 and 125 feet, measured across strike, below fifth bed, and probably between 100 and 150 feet, measured across strike, above the third bed (noted from memory).

For a description of the geologic relations of this coal bed see Report on Coal in Alaska for Use in United States Navy: House Document No. 876, 1914, p. 38.

BARRETT CREEK. CUNNINGHAM CLAIMS.

Sample.—Semibituminous coal; Bering River field; analysis Nos. 12710 and 12714 (p. 19).

Locality.—Cunningham claims on Barrett Creek.

Coal bed.—Unnamed. Tertiary age, Kushtaka formation.

Notes.—The bed was sampled at two points on November 4, 1911. Sample 12714 was taken from an outcrop east of Barrett Creek, about 350 feet up the creek, and about 125 to 150 feet, measured across the strike, from the fourth bed on this creek, and represents 3 to 4 feet of coal next the roof or hanging wall opposite the part represented by sample 12710. There was a band of shale in the middle of the bed 1 to 4 feet thick.

Sample 12710 was taken between the foot wall or floor and the band of shale in the middle of the bed, and represents a bench of coal about 3 feet thick.

For a description of the geologic relations of this coal bed see Report on Coal in Alaska for Use in United States Navy: House Document No. 876, 1914, p. 38.

BARRETT CREEK. CUNNINGHAM CLAIMS.

Sample.—Semibituminous coal; Bering River field; analysis No. 12718 (p. 19).

Locality.—Cunningham claims, on Barrett Creek.

Coal bed.—Unnamed. Tertiary age, Kushtaka formation.

Notes.—The bed was sampled at one point on November 4, 1911. Sample 12718 was taken 20 to 30 feet, measured across strike, above points where samples 12710 and 12714 were taken, about three-quarters mile above mouth of creek.

For a description of the geologic relations of this coal bed see Report on Coal in Alaska for Use in United States Navy: House Document No. 876, 1914, p. 38.

BARRETT CREEK. CUNNINGHAM CLAIMS.

Sample.—Semibituminous coal; Bering River field; analysis No. 12712 (p. 19).

Locality.—Cunningham claims, on Barrett Creek.

Coal bed.—Unnamed. Tertiary age, Kushtaka formation.

Notes.—The coal bed was sampled on November 3, 1911. The sample was taken from a point about 150 feet, measured upstream, or 50 feet, measured across the strike, from points where samples 12710 and 12718 were taken.

For a description of the geologic relations of this coal bed see Report on Coal in Alaska for Use in United States Navy: House Document No. 876, 1914, p. 38.

BRANCH OF CLEAR CREEK. CUNNINGHAM CLAIMS.

Sample.—Semibituminous coal; Bering River field; analysis No. 12711 (p. 19).

Locality.—Cunningham claims, on creek which empties into Clear Creek about 1,000 feet above mouth of Barrett Creek.

Coal bed.—Unnamed. Tertiary age, Kushtaka formation. Thickness at outcrop, 15 feet. The coal in the bed was crushed.

Notes.—The bed was sampled on November 3, 1911. The sample was taken at a point about 3,000 feet northeast of the point on Barrett Creek where sample 12712 was taken.

For a description of the geologic relations of this coal bed see Report on Coal in Alaska for Use in United States Navy: House Document No. 876, 1914, p. 38.

CARBON MOUNTAIN. NO. 1 OPENING.

Sample.—Semibituminous coal; Bering River field; analysis No. 12732 (p. 19).

Locality.—No. 1 opening, on Carbon Mountain.

Coal bed.—Unnamed. Tertiary age, Kushtaka (?) formation.

Notes.—The bed was sampled on November 7, 1911, at No. 1 opening. The bed or lens was 10 or 12 feet thick at this point.

For a description of the geologic relations of this coal bed see Report on Coal in Alaska for Use in United States Navy: House Document No. 876, 1914, p. 45.

CLEAR CREEK. OUTCROP.

Sample.—Semianthracite coal; Bering River field; analyses Nos. 12713, 12715, and 12717 (p. 20).

Locality.—Clear Creek, $4\frac{1}{2}$ miles from mouth of creek.

Coal bed.—Unnamed. Tertiary age, Kushtaka formation.

Thickness, 10 to 13 feet. The bed outcrops just below the main (lower) falls on Clear Creek, about $4\frac{1}{2}$ miles above the mouth of the creek, in the east wall of the gorge, and had not been found in the west wall. The hanging wall or roof is 3 to 4 feet of diabase sill.

Just below the diabase sill or roof is a layer of natural coke, 6 to 10 inches thick.

Notes.—Three samples were taken from this bed on November 4, 1911. Sample 12713 represents the layer of natural coke. Sample 12715 represents 6 to 8 inches of the coal next to the coke. Sample 12717 represents coal from the main part of the bed.

For a description of the geologic relations of this coal bed see Report on Coal in Alaska for Use in United States Navy: House Document No. 876, 1914, p. 41.

CUNNINGHAM CLAIM.

Sample.—Semibituminous coal; Bering River field; analysis No. 12739 (p. 20).

Locality.—Cunningham claim.

Coal bed.—Unnamed.

Notes.—The bed was sampled on November 8, 1911. The sample was taken at the first crosscut off the entry.

No further information available.

GLACIER CREEK.

Sample.—Anthracite; Bering River field; analysis No. 12734 (p. 20).

Locality.—Glacier Creek.

Notes.—This sample was taken on November 8, 1911, from a boulder of anthracite

HARTLINE No. 1 MINE.

Sample.—Semibituminous coal; Bering River field; analysis No. 12724 (p. 20).

Mine.—Hartline No. 1.

Notes.—The bed was sampled at one point on November 6, 1911. No further information available.

HARTLINE No. 2 MINE.

Sample.—Semibituminous coal; Bering River field; analysis No. 12726 (p. 20).

Mine.—Hartline No. 2.

Notes.—The bed was sampled at one point on November 6, 1911. No further information available.

HARTLINE No. 3 MINE.

Sample.—Semibituminous coal; Bering River field; analysis No. 12725 (p. 20).

Mine.—Hartline No. 3.

Notes.—The bed was sampled at one point on November 6, 1911. No further information available.

HARTLINE No. 4 MINE.

Sample.—Semibituminous coal; Bering River field; analysis No. 12727 (p. 20).

Mine.—Hartline No. 4.

Notes.—The bed was sampled at one point on November 6, 1911. No further information available.

HARTLINE No. 5 MINE.

Sample.—Semibituminous coal; Bering River field; analysis No. 12728 (p. 20).

Mine.—Hartline No. 5.

Notes.—The bed was sampled at one point on November 7, 1911. No further information available.

HARTLINE No. 6 MINE.

Sample.—Semibituminous coal; Bering River field; analysis No. 12723 (p. 20).

Mine.—Hartline No. 6.

Notes.—The bed was sampled at one point on November 6, 1911. No further information available.

HUNTS MINE.

Sample.—Semibituminous coal; Bering River field; analysis No. 12729 (p. 20).

Notes.—A sample was taken at the mine on November 7, 1911. No further information available.

MOUNT ANN. TOP OF MOUNTAIN.

Sample.—Anthracite; Bering River field; analyses Nos. 12719 and 12733 (p. 20).

Locality.—Mount Ann.

Notes.—Sample 12719 was taken near the top, and sample 12733 at the top, of Mount Ann on November 7, 1911.

MOUNT ANN. SIDE OF MOUNTAIN.

Sample.—Semianthracite coal; Bering River field; analysis No. 12720 (p. 20).

Locality.—Mount Ann.

Notes.—This sample was taken on the side of Mount Ann on November 4, 1911.

MOUNT HAMILTON. McDONALD MINE.

Sample.—Semibituminous coal; Bering River field; analysis Nos. 12722, 12730, and 12731 (p. 21).

Mine.—McDonald, one-half mile south of U. S. L. M., Christopher group, near south line, top of ridge, on Mount Hamilton.

Coal bed.—Unnamed. Tertiary age, Kushtaka formation. Thickness about 15 feet. Nearly vertical.

The bed was sampled at three points in the mine on November 6, 7, and 8, 1911. Sample 12722 was taken at the face of the entry. No further information available.

ST. MARYS CREEK. HARTLINE No. 7 MINE.

Sample.—Semibituminous coal; Bering River field; analysis No. 12721 (p. 21).

Mine.—Hartline No. 7.

Coal bed.—Unnamed. Tertiary age.

Notes.—The bed was sampled at one point on November 6, 1911. No further information available.

TROUT CREEK. CUNNINGHAM PROSPECT TUNNELS No. 4 AND No. 5.

Sample.—Semibituminous coal, analyses Nos. 15355, 15356, 15357, 15358, 15359, and 15360 (p. 21).

Locality.—Prospect tunnels No. 4 and No. 5, on the Cunningham claims, about one-fourth of a mile down the creek from the Cunningham cabin on Trout Creek. No. 4 tunnel is about 100 feet below No. 5 tunnel.

Coal bed.—Unnamed bed. Tertiary age, Kushtaka formation. The thickness of the bed as mined in these tunnels average 6 feet 9 inches. The roof was a treacherous shale; the floor a sandstone.

The bed was measured and sampled at four points in tunnel No. 4 and at two points in tunnel No. 5 by W. A. Selvig on November 12 to 22, 1912, as described below:

Section of coal bed in prospect tunnel No. 4, Cunningham claim, Trout Creek.

Section.....	A	B	C	D
Laboratory No.	15355	15356	15357	15358
Roof; shale, sandstone, and coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 8	2 5	...	1 0
Charcoal, dirt, and shale.....	a 0 2½	a 0 5	a 2 3	a 0 5
Coal.....	1 2	1 8	5 8½	1 11
Charcoal, shale, and "sulphur".....	a 0 1½	a 0 4	a 0 ½	a 0 3
Coal.....	1 6	...	2 7¼	3 8
Floor, sandstone and coal.				
Thickness of bed.....	5 8	4 10	10 7½	7 3
Thickness of coal sampled.....	5 4	4 1	8 3¼	6 7

a Not included in sample.

Section A (sample 15355) was measured in the chute between timber sets 19 and 20, 76 feet from the drift mouth and 10 feet from the entry.

Section B (sample 15356) was measured on the rib of the right crosscut between timber sets 18 and 19, 72 feet from the drift mouth and 17 feet from the entry.

Section C (sample 15357) was measured on the rib near the face of the right crosscut between timber sets 11 and 12, 44 feet from the drift mouth.

Section D (sample 15358) was measured in the right crosscut between timber sets 25 and 26, 100 feet from the drift mouth and 11 feet from the entry.

Section of coal bed in prospect tunnel No. 5, Cunningham claim, Trout Creek.

Section.....	A	B
Laboratory No.....	15359	15360
Roof, shale and coal.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 8	...
Shale and dirt.....	a0 8	...
Coal.....	2 7	4 0
Charcoal and shale.....	a1 7	a1 7
Coal.....	...	1 3
Floor: coal.....	...	...
Thickness of bed.....	7 6	6 10
Thickness of coal sampled.....	5 3	5 3

a Not included in sample.

Section A (sample 15359) was measured in the chute to the left of the entry between timber sets 21 and 22, 84 feet from the drift mouth and 17 feet up chute.

Section B (sample 15360) was measured in the left crosscut between timber sets 13 and 14, 52 feet from the drift mouth and 5 feet from the entry.

The coal beds of the Trout Creek region are described in U. S. Geol. Survey Bull. 335, 1908, p. 72.

MATANUSKA.

ANTHRACITE RIDGE. OUTCROP.

Sample.—Semianthracite coal; Matanuska field; analysis No. 12745 (p. 22).

Locality.—Anthracite Ridge, Matanuska Valley.

Coal bed.—Not named.

Notes.—The bed was sampled on November 1, 1911.

The coal beds of the Anthracite Ridge region are described in U. S. Geol. Survey Bull. 327, 1907, pp. 52–56.

ANTHRACITE RIDGE. OUTCROP.

Sample.—Bituminous coal; Matanuska field; analysis No. 12750 (p. 22).

Locality.—Anthracite Ridge, Matanuska Valley.

Coal bed.—Not named.

Notes.—This bed was sampled on October 27, 1911.

The coal beds of the Anthracite Ridge region are described in U. S. Geol. Survey Bull. 327, 1907, pp. 52–56.

ANTHRACITE RIDGE. OUTCROP.

Sample.—Semibituminous coal; Matanuska field; analysis No. 12753 (p. 22).

Locality.—Anthracite Ridge.

Coal bed.—Unnamed.

Notes.—The bed was sampled on October 24, 1911.

The coal beds of the Anthracite Ridge region are described in U. S. Geol. Survey Bull. 327, 1907, pp. 52–56.

ANTHRACITE RIDGE. OUTCROP.

Sample.—Semianthracite coal; Matanuska field; analysis No. 12746 (p. 22).

Locality.—Anthracite Ridge, Matanuska Valley.

Coal bed.—Not named.

Notes.—The bed was sampled at the outcrop near the middle of the south face of the ridge. Elevation (by barometer), 3,700 feet.

The coal beds of the Anthracite Ridge region are described in U. S. Geol. Survey Bull. 327, 1914, pp. 52–56.

ANTHRACITE RIDGE. OUTCROP.

Sample.—Semianthracite coal; Matanuska field; analysis No. 12757 (p. 22).

Locality.—Outcrop on Anthracite Ridge.

Coal bed.—Not named.

Notes.—The bed was sampled on October 26, 1911. The sample was taken at the outcrop, near the middle of the south slope. Elevation (by barometer), 4,100 feet.

The coal beds of the Anthracite Ridge region are described in U. S. Geol. Survey Bull. 327, 1914, pp. 52-56.

CHICKALOON CREEK. OUTCROP.

Sample.—Bituminous coal; Matanuska field; analyses Nos. 12752 and 12764 (p. 22).

Locality.—Outcrop at bend of Chickaloon Creek, one-half mile above Watson Camp.^a

Coal bed.—Not named. Tertiary age, Chickaloon formation.

The bed was measured and sampled by J. A. Holmes on November 1, 1911.

Beginning on the south side of a series of beds of shale and sandstone, 180 to 200 feet thick, and measuring southward along the face of the bluff from a nearly vertical bed of sandstone 12 feet thick, this section was as follows:

Section of coal bed $\frac{1}{2}$ mile above Watsons Camp.

	<i>Ft. in.</i>
Shale.....	0 9
Bony coal and streaks of coal.....	0 10
Impure and other coal.....	1 0
Coal.....	^a 2 9
Shale.....	1 4
Coal.....	0 2
Shale.....	0 1
Coal.....	0 4
Shallow coal.....	0 9
Bone.....	0 1
Coal.....	1 0
Shale and sandstone ("horse").....	9 6
Coal.....	0 4
Shale.....	1 0
Coal.....	0 6
Shale.....	0 4
Coal.....	0 9
Shale with streaks of coal.....	1 4
Coal.....	0 8
Shale.....	0 2
Coal.....	^b 4 10
	28 6

^a Included in sample 12753.

^b Included in sample 12764.

Notes.—For a description of the geologic relations of this coal bed, see U. S. Geol. Survey Bull. 327, 1907, p. 44; Bull. 500, 1912, p. 78.

CHICKALOON CREEK. WATSON TUNNEL NO. 4.

Sample.—Semibituminous coal; Matanuska field; analysis No. 12758 (p. 22).

Locality.—Watson Tunnel No. 4, near Watson Camp, Chickaloon Creek.

Coal bed.—Unnamed. Tertiary age, Chickaloon formation. Thickness, about 10 feet. The bed contained 4 feet 6 inches of crushed coal and two or three bands of bony coal. Strike, east and west; dip, 80° N. Floor and roof, carbonaceous shale, much jointed and slickensided.

^a See Martin's section, U. S. Geol. Survey Bull. 327, p. 44, Nos. 2 and 6.

Notes.—The sample was taken in the west crosscut off the entry, 111 feet from the entry mouth. The crosscut to the east had caved and the face could not be reached.

The coal beds in the vicinity of Chickaloon Creek are described in U. S. Geol. Survey Bull. 500, 1912, pp. 77-81.

CHICKALOON CREEK. PROSPECT.

Sample.—Semibituminous coal; Matanuska field; analysis No. 12761 (p. 22).

Locality.—Chickaloon Creek.

Coal bed.—Unnamed. Tertiary age, Chickaloon formation.

Notes.—The bed was sampled on November 2, 1911.

The coal beds in the vicinity of Chickaloon Creek are described in U. S. Geol. Survey Bull. 500, 1912, pp. 77-81.

CHICKALOON CREEK. TUNNEL B.

Sample.—Semibituminous coal; Matanuska field; analysis Nos. 12756 and 12760 (pp. 22 and 23).

Locality.—Tunnel B, on Chickaloon Creek.

Coal bed.—Unnamed. Tertiary age, Chickaloon formation.

Notes.—The bed was measured and sampled at one point in the entry on October 25, 1911, as described below:

Section of coal bed in Tunnel B, Chickaloon Creek.

	<i>Ft. in.</i>
Coal, impure.....	a 3 3
Bone.....	0 4
Coal.....	1 0
Bone, lenticular.....	0 6
Coal.....	1 0
Shale.....	1 0
Coal.....	1 1
Shale.....	0 3
Coal.....	1 8
Shale.....	1 1
Coal, good..	b 3 10

a Included in sample 12760.

b Included in sample 12756.

Notes.—For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 327, 1907, p. 5; Bull. 500, 1912, p. 79.

COAL CREEK. PROSPECT.

Sample.—Bituminous coal; Matanuska field; analysis No. 12744 (p. 23).

Locality.—Prospect on Coal Creek.

Coal bed.—Unnamed. Tertiary age, Chickaloon (?) formation.

Notes.—The bed was sampled on October 27, 1911.
available.

The coal beds in the vicinity of Coal Creek are described in U. S. Geol. Survey Bull. 500, 1912, pp. 77-78.

COAL CREEK. PROSPECT.

Sample.—Bituminous coal; Matanuska field; analysis No. 12748 (p. 23).

Locality.—Prospect on Coal Creek.

Coal bed.—Unnamed. Tertiary age, Chickaloon (?) formation.

Notes.—The bed was sampled on November 7, 1911.

The coal beds in the vicinity of Coal Creek are described in U. S. Geol. Survey Bull. 327, 1912, pp. 77-78.

COAL CREEK (?).

Sample.—Bituminous coal; Matanuska field; analysis No. 12743 (p. 23).

Note.—No further information available.

MATANUSKA RIVER. O'BRIEN CLAIMS.

Sample.—Bituminous coal; Matanuska field; analysis Nos. 12755 and 12762 (p. 23).

Locality.—Outcrop 1 mile south of Matanuska River, on O'Brien group of claims.

Coal bed.—Unnamed. Tertiary age, Chickaloon formation.

About 1 mile south of Matanuska River the bed outcrops on the north face of a bluff, about 555 feet above the level of Matanuska River, probably near the 1,600-foot contour line and southwest of the east end of Anthracite Ridge. The coal is exposed just east of a shallow ravine extending up the face of this bluff. Strike, N. 75° E., dip 23° SE.

The bed was measured and sampled at this point by J. A. Holmes in September, 1911, as described below:

Section of coal bed, north face of bluff.

	<i>Ft. in.</i>
Carbonaceous shale.....	0 12
Coal.....	0 4
Shale.....	0 1
Coal.....	0 10
Shale.....	1-2 0
Coal.....	0 9
Shale.....	0 2
Coal.....	0 10
Bony coal.....	0 1½
Coal.....	2 5
Shale.....	0 1-2(?)
Coal.....	1 1
Bony coal.....	0 1
Sandstone.....	0 5-7
Coal.....	0 7
Bony coal.....	0 2½
Sandy shale and bony coal.....	0 2-3
Coal.....	1 2
Bone.....	0 1
Coal.....	4 1
Bone.....	0 1
Coal.....	0 2
Bone.....	0 ½
Coal.....	0 10
Coal, slightly bony.....	0 2
Coal.....	0 8
Coal, slightly bony.....	0 10
Shale.....	0 2-6
Coal.....	1 0
Shale, with streaks of coal.....	1 0
Coal.....	1+ 0

The base of this bed was covered up. The samples include the entire section as given above except the bottom 12 inches.

Sample 12755 represents the upper part of the bed, and sample 12762 the lower part of the bed.

MATANUSKA RIVER. O'BRIEN CLAIMS.

Sample.—Bituminous coal; Matanuska field; analysis No. 12763 (p. 23).

Locality.—Outcrop, on the O'Brien group of claims, Matanuska River.

Coal bed.—Unnamed. Tertiary age, Chickaloon formation.

The bed was measured and sampled by J. A. Holmes on November 2, 1911, as described below:

Section of coal bed at outcrop, south of Matanuska River.

Laboratory No.	12763	
	<i>Ft.</i>	<i>in.</i>
Carbonaceous shale.....	0	10
Coal.....	4	6
Shale.....	3	3
Bony coal with streaks of good coal.....	0	10
Coal.....	0	9
Bony coal.....	0	7
Shale with irregular bands of coal.....	3	5
Coal.....	3	3
Bony coal.....	1	7
Shale.....	0	5
Coal with impure or bony bands.....	1	5
Shale.....	3	5
Coal with bony bands.....	1	6
Shale.....	1	3
Bony coal.....	1	6
Coal.....	1	7
Shale.....		

The sample was taken at an outcrop in the west face and bed of a ravine, about 100 feet below the top of the bluff. The point where the sample was taken is one-fourth of a mile south of the point where samples 12755 and 12762 were taken, and is southwest of the east end of Anthracite Ridge. Strike, N. 60 W., dip 20° to 40° SW.

MATANUSKA RIVER. O'BRIEN CLAIMS.

Sample.—Bituminous coal; Matanuska field; analysis No. 12747 (p. 23).

Locality.—Outcrop, O'Brien claims, Matanuska River.

Coal bed.—Unnamed. Tertiary age, Chickaloon formation.

The bed was sampled at one point on October 27, 1911.

Notes.—The sample was taken near and on the west side of the gulch, and 35 to 55 feet above the point where sample 12763 was taken. The bed was partly exposed and had apparently the same strike and dip as the bed represented by sample 12763. A section of the part exposed, measured from above downward, was as follows: Coal, 3½ to 4 feet; shale, 6 to 10 inches; coal, 1 to 3 feet.

MATANUSKA RIVER. O'BRIEN CLAIMS.

Sample.—Bituminous coal; Matanuska field; analysis No. 12749 (p. 23).

Locality.—Outcrop about 1 mile south of Matanuska River, on O'Brien claim.

Coal bed.—Unnamed. Tertiary age, Chickaloon formation.

The bed was measured and sampled at one point on October 27, 1911, as described below:

Section of coal bed at outcrop, 1 mile south of river.

Laboratory No.	12749	
	<i>Ft.</i>	<i>in.</i>
Shale with streaks of coal.....	a 2	7
Coal.....	2	10
Shale.....	a 0	2-5
Coal.....	a 1	0
Shale with bands of coal.....	a 2	0
Shale.....	a 4-5	0
Carbonaceous shale with streaks of coal.....	a 1-2	0

a Not included in sample.

The sample was taken from an outcrop in the east face of the gulch, and 50 to 75 feet above the point (across strata) where sample 12763 was taken and about 50 feet below top of bluff.

MATANUSKA RIVER. O'BRIEN CLAIMS.

Sample.—Bituminous coal; Matanuska field; analysis No. 12751 (p. 23).

Locality.—Outcrop one-half mile south of Matanuska River, near O'Brien cabin.

Coal bed.—Not named. Tertiary age, Chickaloon formation.

The bed was measured and sampled at one point by J. A. Holmes on November 1, 1911.

Sample 12751 was taken at a point about one-half mile south of Matanuska River, near a small stream which flows north (toward river) by the T. E. O'Brien cabin on the O'Brien coal claim and some 300 yards up this stream from the point where sample 12754 was taken in the west or right face of the bluff. The bed is exposed from a few feet above the level of the creek to near the top of the bluff. The bed here has a strike nearly east and west and a dip 60° to 70° NNW. The section measured from the north side southward was about as follows:

Section of coal bed, near O'Brien cabin.

Laboratory No.	12751
Shale.....	<i>Ft. In.</i>
Coal, impure.....	a 1 0
Shale.....	a 0 4-6
Coal with few thin bony bands.....	6 0
Igneous rock.....	a 6-8 0
Coal with occasional bands of shale and bone (probably 75 per cent coal).....	a 14 0
Shale.....	a 1-2 0
Altered rock, light-colored, earthy.....	

a Not included in sample.

The shale and other rock strata on south side of the bed were faulted.

MATANUSKA RIVER. O'BRIEN CLAIMS.

Sample.—Bituminous coal; Matanuska field; analysis 12754 (p. 23).

Locality.—O'Brien claim, one-half mile south of Matanuska River.

Coal bed.—Unnamed. Tertiary age, Chickaloon formation.

The bed was measured and sampled at one point by J. A. Holmes on October 24, 1911.

Sample 12754 was taken from an outcrop on the west slope of a gulch (facing east), one-half mile south of Matanuska River and a short distance up a small stream from the cabin of T. E. O'Brien. The bed outcrops about 100 feet above the level of the creek and shows thick irregular beds of coal interbedded with thin irregular layers of ferruginous sandstone(?), with other thin or nearly vertical beds that resemble somewhat the eruptive rocks seen elsewhere in this field. The beds of coal are irregular and in places massive, and stand out prominently in the natural exposure. Strike nearly east and west. The bed is nearly vertical.

A section across the main beds of coal measured from north to south was as follows:

Section of coal bed one-half mile south of Matanuska River.

Laboratory No.	12754
Shale, with 5 to 10 inch bands of "iron ore" in more or less nodular masses.....	<i>Ft. in.</i>
Coal.....	3 6
Bony coal.....	a 0 11
Carbonaceous shale.....	a 0 6-10
Coal.....	a 0 6-10
Shale.....	a 0 6-10
Coal, pinching out in places.....	a 1-1 0
Shale.....	a 1-2 0
Coal, with irregular bands of bony coal.....	a 1 1-2 0
Shale, with streaks of coal.....	a 1-1 0
Impure bony coal.....	a 4 0
Shale, with nodular bands of "iron ore".....	a 5 10
Bony coal in lenticular masses, 1 to 6 inches thick interbedded in carbonaceous shale.....	a 19 0
Shale, dark colored, impregnated and in places interbedded with nodular bands (1 to 8 inches thick) of "iron ore".....	30-40 0

a Not included in sample.

MATANUSKA RIVER. O'BRIEN CLAIMS.

Sample.—Bituminous coal; Matanuska field; analysis No. 12759 (p. 23).

Locality.—Outcrop on O'Brien claim, about one-half mile south of Matanuska River.

Coal bed.—Unnamed. Tertiary age, Chickaloon formation.

The bed was measured and sampled at one point by J. A. Holmes on November 2, 1911.

Sample 12759 was taken from an outcrop on the west side and near top of bluff (facing east) across the gulch from the point where sample 12751 was taken. It is probably the same bed. The exposure was prominent, but the boundaries were not clearly defined. A section measured from the north side southward was as follows:

Section of coal bed, west side of bluff.

	<i>Ft.</i>	<i>in.</i>
Soft black shale.....	0	4
Coal.....	0	8
Shale.....	1	8
Coal.....	5	a 10
Shale.....	0	8
Impure coal.....	0	6
Shale.....	0	10
Coal.....	0	9
Shale.....	0	3
Coal.....	0	10
Bony coal.....	0	6
Shale.....	0	5
Coal.....	2	6
Shale.....	0	1
Coal.....	0	11
Bone.....	0	1
Coal.....	2	9
Shale, with irregular bands of bony coal.....	1-3	0
Coal.....	0	1-18
Bony coal with streaks of shale.....	1-3	0
Coal.....	1	4
Shale.....	0	2
Coal.....	1	2
Bony coal.....	1	2
Coal.....	0	8

a Or more.

Notes.—In the upper part of the bed the coal appears to fold on itself southward and thus gives the appearance of being 25 to 30 feet thicker than would be indicated by the above section.

YOUNG CREEK. OUTCROP.

Sample.—Bituminous coal; Matanuska field; analysis No. 11382 (p. 23).

Locality.—Outcrop near Young Creek; longitude 148° 42' 12" west, latitude 61° 47' 40" north.

Coal bed.—Unnamed. Tertiary age, Chickaloon formation. Dip, 54° SE.; strike, N. 67° E.

The bed was sampled by G. C. Martin on August 11, 1910, in the vicinity of Young Creek. The sample was cut from a natural outcrop after cleaning off with a pick as far as possible all weathered coal. The bed was not measured at this point, but a typical section measured on the north face of Red Mountain about 4 miles north of the mouth of Young Creek is as follows:

Section of coal bed on north face of Red Mountain, about 4 miles north of mouth of Young Creek.

	<i>Ft. in.</i>
Roof, shale with ironstone nodules.....	7 5
Coal (exposure obscure; thickness estimated).....	0 1½
Shale.....	1 2
Coal.....	0 1
Shale.....	0 6
Coal.....	0 1½
Shale.....	0 7
Coal.....	0 ¾
Shale.....	0 4
Coal.....	0 ½
Shale.....	0 2
Coal.....	0 ¾
Shale.....	2 0
Coal.....	12 8
Thickness of bed.....	

Notes.—Another coal bed at least 5 feet and possibly 10 feet thick is poorly exposed about 30 feet stratigraphically above this, the intervening rocks being shale with ironstone nodules and sandstone. About 30 feet higher another bed of unknown thickness is present and 50 feet still higher indications of another bed were seen.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 480, p. 129.

COLORADO.

ADAMS COUNTY.

BENNETT. THOMAS MINE.

Sample.—Subbituminous coal; Denver region; analysis No. 13141 (p. 23).

Mine.—Thomas, in sec. 12, T. 1 S., R. 61 W., about 25 miles northeast of Bennett, on the Union Pacific Railroad.

Coal bed.—No name. Cretaceous age, Laramie formation.

The bed was measured and sampled at one point in the mine by G. B. Richardson on October 23, 1911. The sample was from a 4-foot bench of coal. There was coal, reported 2 feet thick, above the bench sampled, and coal, reported 2 feet thick, below it.

The sample was obtained at the working face in the mine, about 100 feet south of the bottom of the shaft, which is 110 feet deep.

Notes.—The coal beds of the Denver Basin are described in U. S. Geol. Survey Bull. 381, 1910, pp. 297-306.

BOULDER COUNTY.

LAFAYETTE. SIMPSON MINE.

Sample.—Subbituminous coal; Denver region; analysis No. 15165 (p. 24).

Mine.—Simpson, a shaft mine in the Northern district; in T. 1 S., R. 69 W.; at Lafayette, on the Colorado & Southern Railway.

Coal bed.—Known as the Simpson or Lower. Cretaceous age, Laramie formation. The bed is practically horizontal. Thickness, 6 to 14 feet, average 12 feet. The characteristic impurities are local bone and "sulphur" partings. Roof, hard gray shale, overlain by sandstone; floor, soft smooth underclay. Particles of the roof and floor did not mix with the coal in loading.

The bed was measured and sampled at one point in the mine by J. C. Roberts on November 15, 1912, as described below:

Section of coal bed in Simpson mine.

Laboratory No.	15165
Roof, shale.	<i>Ft. In.</i>
Coal.	a 4 2
Coal.	4 2
Bone.	0 3
Coal.	2 5
Floor, clay.	
Thickness of bed.	11 0
Thickness of coal sampled.	6 10

a Not included in sample; is good coal but is mined only when mining pillars on retreating.

Section A (sample 15165) was measured at the face of room 1, off entry 125.

Notes.—The mine is worked by the room-and-pillar system. At the time of sampling, the coal was undercut by air punching machines and broken down with black blasting powder. The undercuttings were loaded out with the coal. All coal was shipped as run-of-mine. There were three loading tracks with a capacity of 30 empty and 30 loaded cars. The mine had approximately 300 acres of undeveloped coal. The daily output was about 450 tons, most of which was taken from pillars.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 54, 55, 398, 399.

For results of tests of other coal from this mine, see mention of specific tests as follows—Steaming tests: U. S. Geol. Survey Bull. 261, p. 80; producer-gas tests: U. S. Geol. Survey Bull. 261, p. 90; Bureau of Mines Bull. 13, pp. 108, 272; briquetting tests: U. S. Geol. Survey Bull. 261, p. 152; coking tests: Bureau of Mines Bull. 5, pp. 21, 51.

DELTA COUNTY.

BOWIE. KING MINE.

Sample.—Bituminous (noncoking) coal; Grand Mesa field; analysis No. 15213 (p. 24).

Mine.—King, a drift mine in the Somerset district, 1 mile from Bowie, on the Denver & Rio Grande Railroad.

Coal bed.—King. Cretaceous age, Mesaverde formation. Average thickness, 10 feet; dip, N. 23° 33' E.; cleat, N. 82° E. Occasional faults and frequent rolls or horsebacks are encountered. The immediate roof, a bony coal 2 to 6 feet thick, is overlain by 15 feet of sandstone. The floor is bony coal 2 to 6 inches thick, underlain by sandstone. Particles of the roof and floor did not become mixed with the coal in mining or loading. Workable beds of coal occur 20 feet above and 80 feet below the King bed. Cover at point of sampling, 900 feet.

The bed was measured and sampled at one point in the mine by W. D. Schofield on December 7, 1912. The section measured 10 feet 2 inches of clear coal, all of which was included in the sample.

The sample was cut from the face of room 5, off left entry 3, 3,600 feet from the mine mouth.

Notes.—The mine is worked on the room-and-pillar system. At the time of sampling the coal was undercut by hand and blasted down with FFF black blasting powder and a permissible explosive. The tippie had two shaking screens 8 feet wide by 12 feet long; one screen had 4-inch holes and the other had 1-inch holes, about 55 to 60 per cent of the coal passing the screens. No pickers were employed on the cars. The lumps were large and the coal had a good appearance on the cars. There were three loading tracks with a capacity of 30 empty and 60 loaded cars. The mine had a capacity of 1,000 tons a day; the average output being about 450 tons.

There were approximately 1,000 acres of unmined coal tributary to this tippie, about 33 per cent of the coal being obtained from advance workings.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 55, 401.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 341, 1909, p. 330.

DOMINGUEZ. WELLS GULCH MINE.

Sample.—Bituminous coal; Grand Mesa field; analysis No. 11106 (p.24).

Mine.—Wells Gulch; sec. 17, T. 4 S., R. 3 E.; in Wells Gulch, Gunnison Valley, about 2½ miles northeast of Dominguez, which is the nearest station on the Denver & Rio Grande Railroad.

Coal bed.—The geologic age of the bed has not been definitely determined. Thickness, 3 feet 11 inches; roof, sandstone; floor, shale. The bed was measured and sampled at one point in the mine by E. G. Woodruff, on October 19, 1910, as described below:

Section of coal bed in Wells Gulch Mine.

Laboratory No.....	11106
Roof, sandstone.....	<i>Ft. in.</i>
Coal.....	1 8
Shale, carbonaceous, or bone.....	a 2 3
Floor, shale:	
Thickness of bed.....	3 11
Thickness of coal sampled.....	1 8

a Not included in sample.

Sample 11106 was taken at the face of the entry, about 200 feet from the mine mouth. At the time of sampling, the mine was not being worked. The face had been exposed for several months, and was cleaned with a pick prior to sampling.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 471, 1912, p. 567.

EL PASO COUNTY.

CALHAN. MOSBY MINE.

Sample.—Subbituminous coal; Colorado Springs field; analysis No. 10732 (p. 24).

Mine.—Mosby, a shaft mine in sec. 18, T. 13 S., R. 62 W., 9 miles south of Calhan, which is the nearest station on the Chicago, Rock Island, & Pacific Railway.

Coal bed.—Mosby. Cretaceous age, Laramie formation. Thickness, 4 feet 8 inches. Roof, sandy shale. The bed was measured and sampled at one point in the mine by G. B. Richardson on August 3, 1910, as described below:

Section of coal bed in Mosby mine.

Laboratory No.....	10732
Roof, sandy shale.....	<i>Ft. in.</i>
Coal.....	1 2
Parting.....	a 0 1
Coal.....	1 6
Parting.....	a 0 3
Coal.....	1 8
Floor, not stated.	
Thickness of bed.....	4 8
Thickness of coal sampled.....	4 4

a Not included in sample.

The sample was taken about 30 feet from the bottom of the 40-foot shaft at the working face. The mine was worked intermittently.

PIKEVIEW. PIKEVIEW MINE.

Sample.—Subbituminous coal; Colorado Springs field; analysis No. 12099 (p. 24).

Mine.—Pikeview, a shaft mine in sec. 18, T. 13 S., R. 66 W., 1 mile north of Pikeview station, on the Denver & Rio Grande Railroad.

Coal bed.—A. Cretaceous age, Laramie formation. Average thickness, about 12 feet; dip, 4° N., 35° E. The bed contains numerous rolls. Cover at point of sampling, 181 feet. Roof, a thin blue shale, above which is a soft sandstone. The floor is a rough shale and a fire clay and is fairly hard.

The bed was measured and sampled at one point in the mine by J. C. Roberts, on April 12, 1911. The sample was taken at the face of north entry 2, 4,000 feet northwest of the shaft. The bed at this point was 10 feet 6 inches thick, but the sample represents only 7 feet 5 inches, the upper 3 feet of the bed being left for roof.

Notes.—Mining is by the room-and-pillar system. At the time of sampling the coal was undercut in the clay and blasted down with FFF black powder. The coal is soft and lignitic. About 60 per cent of the output was sold as run-of-mine. About 60 per cent of the coal would pass through a 4½-inch screen, leaving 40 per cent domestic lump. Pickers were employed both in the mine and on the car. There were three loading tracks with a capacity of 25 empty and 25 loaded cars. The output was 550 to 600 tons a day. The unmined area covered about 640 acres.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 381, 1910, pp. 322-332.

RAMAH. PURDON MINE.

Sample.—Subbituminous coal; Colorado Springs field; analysis No. 10741 (p. 24).

Mine.—Purdon; sec. 27, T. 11 S., R. 61 W.; 3 miles southwest of Ramah, which is the nearest station on the Chicago, Rock Island & Pacific Railway, and 6 miles northeast of Calhan.

Coal bed.—Locally known as Purdon. Cretaceous age, Laramie formation. Thickness, 6 feet 9½ inches. Roof, sandy shale. The bed was measured and sampled by G. B. Richardson on August 15, 1910, as described below:

Section of coal bed in Purdon mine.

Laboratory No.....	10741
Roof, sandy shale.....	<i>Ft. in.</i>
Coal.....	1 0
Shale, sandy.....	00 1½
Coal, with 5 partings, each less than ¼ inch thick.....	2 8
Shale, sandy, and coal.....	00 2
Coal with 3 partings, each less than ¼ inch thick.....	2 10
Floor, not stated.....	
Thickness of bed.....	6 9½
Thickness of coal sampled.....	6 6

α Not included in sample.

The above sample was taken at the face of the workings, about 700 feet from the entry.

Notes.—The mine was worked intermittently.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 57, 408.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 381, 1910, pp. 319-335.

FREMONT COUNTY.

CHANDLER. CHANDLER MINE.

Sample.—Subbituminous coal; Canon City field; analyses Nos. 13393, 13394, and 13395 (pp. 24 and 25).

Mine.—Chandler, a shaft mine in sec. 22, T. 19 S., R. 70 W., near Chandler, on a spur of the Denver & Rio Grande Railroad.

Coal bed.—Canon. Cretaceous age, Vermejo formation. Average thickness, 4 feet 3 inches; dip, 4° north. The bed is free from faults but contains rolls and horsebacks. The roof is a "draw slate" 6 to 10 inches thick which comes down with the coal; above this "draw slate" is a cap rock. The floor is a soft, rough, shaly sand rock. Cover at points of sampling, about 700 feet.

The bed was measured and sampled at two points in the mine by J. C. Roberts on February 27, 1912, as described below:

Sections of coal bed in Chandler Mine.

Section	A. 13393	B. 13394
Laboratory No.	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, "draw slate."	6 6	4 9
Bone	4 2	4 9
Coal, clean	4 8	4 9
Floor, shaly sand rock.	4 2	4 9
Thickness of bed		
Thickness of coal sampled		

a Not included in sample.

Section A (sample 13393) was measured at the face of east entry 9.

Section B (sample 13394) was measured at the face of the main slope.

A composite sample was made by combining and mixing face samples 13393 and 13394. The ultimate analysis of this sample is given under laboratory No. 13395.

Notes.—The shaft is 484 feet deep. The coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut by electric chain cutting machines and was shot down with a permissible explosive. "Forty per cent" dynamite was used for brushing the roof. The tippie was equipped with bar screens 18 feet long with 2-inch openings and a revolving screen 16 feet long with $\frac{3}{4}$ -inch to $1\frac{1}{4}$ -inch holes. About 40 per cent of the coal passed through the screens, none being shipped as run-of-mine. Pickers were employed on both picking table and car in loading. There were two loading tracks with a capacity of 36 empty cars and 30 loaded cars. The coal had a good appearance and contained large lumps. The average daily output of the mine was 550 tons. About 90 per cent of the coal was from advance workings and 10 per cent from pillars. The life of the mine would be probably 10 years.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 58, 414.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 381, 1910, p. 358.

ROCKVALE. ROCKVALE MINE.

Sample.—Subbituminous coal; Canon City field; analyses Nos. 11938, 11939, and 11941 (p. 25).

Mine.—Rockvale, a slope mine in secs. 25 and 36, T. 19 S., R. 70 W., and secs. 30 and 31, T. 19 S., R. 69 W., at Rockvale, on the Atchison, Topeka & Santa Fe Railway.

Coal bed.—Rockvale. Cretaceous age, Vermejo formation. Average thickness, 3 feet 6 inches; dip, 5° N. 60° W. The roof is sandstone and black shale, which is hard

at some places and soft in others, is generally smooth, and does not adhere to the coal. The floor is a mixture of coal and clay and is called "blackjack"; it is tough and usually smooth. Cover, about 320 feet.

The bed was measured and sampled at two places in the mine by J. C. Roberts on March 7, 1911.

Sample 11938 was measured at the face of room 39, off the third dip, about 6,000 feet south from the shaft. The sample represents 3 feet 9½ inches of clear coal.

Sample 11939 was measured at the face of room 31, off the fourth dip, 6,200 feet south of the shaft. The sample represents 3 feet 9 inches of clear coal.

A composite sample was made by combining face samples 11938 and 11939. The results of an ultimate analysis of this sample are given under laboratory No. 11941.

Notes.—The long-wall method of mining is used. At the time of sampling all of the coal produced was from advance workings. The coal was undercut in the clay and broken down by black powder; "40 per cent" dynamite was used in brushing the roof. All of the coal was screened, none being sold as run-of-mine. About 43 per cent of the coal passed through a 3-inch screen, the screenings producing 18 per cent nut coal and 25 per cent slack; 57 per cent of the coal was sold as lump. Pickers were employed to pick the coal as it was loaded on the car. There were two loading tracks with a capacity of 100 empty cars and 50 loaded cars.

The daily output was about 900 tons; the unmined area tributary to the mine was about 1,200 acres.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 59, 415.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 381, 1910, p. 352.

GARFIELD COUNTY.

NEWCASTLE. VULCAN MINE.

Sample.—Bituminous coal; Grand Hogback field; analyses Nos. 12325, 12326, 12327, and 12420 (p. 25).

Mine.—Vulcan; Glenwood Springs district; sec. 1, T. 6 S., R. 91 W.; 2 miles east of Newcastle, on the Colorado Midland Railway.

Coal bed.—Allen. Cretaceous age, Mesaverde formation. Average thickness, about 14 feet. Roof, a poor quality of sandstone; floor, sandstone.

The bed was measured and sampled at three points in the mine by J. C. Roberts on June 14 and 18, 1911.

Sample 12325 was cut from the face of the east entry on the third level, 1,250 feet southeast of the mine mouth. The sample represents 10 feet 6 inches of coal from the lower part of the section.

Sample 12326 was cut from the face of the Allen entry on the second level, 1,700 feet from the mouth of the entry. The sample represents 10 feet of coal from the lower part of the section.

Sample 12420 was cut from the face of room 15, 250 feet up from the entry and 1,000 feet southeast of the mine mouth. The sample represents 10 feet of coal from the middle of the section.

A composite sample was made by combining and mixing face samples 12325 and 12326. An ultimate analysis of this sample is given under laboratory No. 12327.

Notes.—The coal is mined by the room-and-pillar system. The bottom bench of about 6 feet was first mined, then the top bench was taken down and pillars removed. At the time of sampling the entire output was shipped as run-of-mine except what was delivered by wagon for domestic purposes. The coal loaded on wagons was screened over bars 12 feet long with 2-inch openings. There were three loading tracks with a capacity of 20 empty cars and 25 loaded cars. The daily output was about

150 tons. The probable life of the mine was 50 years. All the coal mined was taken from advance workings.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 415, 1910, p. 112.

SOUTH CANYON. SOUTH CANYON MINE.

Sample.—Bituminous (noncoking) coal; Grand Hogback field; analyses Nos. 15166 and 15167 (p. 25).

Mine.—South Canyon, a drift mine in the Glenwood Springs district, in the NW. $\frac{1}{4}$ sec. 14, T. 6 S., R. 90 W., at South Canyon, 3 miles from the Colorado Midland Railway and connected with the railroad station by trolley line.

Coal bed.—Wheeler; Cretaceous age, Mesaverde formation. Average thickness, 18 feet; dip 55°. There are no cleats or faults but occasional rolls and horsebacks are encountered. The roof (hanging wall) is a hard black shale above which there is a sandstone cap rock. The floor is a smooth, soft, black shale. Particles of the roof and floor did not mix with the coal in mining. Seventy-two feet above this bed and 32 feet underneath are workable beds of coal. Cover at points of sampling, 500 to 550 feet.

The bed was measured and sampled at two points in the mine by J. C. Roberts on November 30, 1912, as described below:

Sections of coal bed in South Canyon Mine.

Section.....	A		B	
	15166		15167	
Laboratory No.....				
Roof, shale.....	Ft.	in.	Ft.	in.
Top coal.....	5	9	10	0
Coal.....	(b)		7	8
Floor, shale.....				
Thickness of bed.....	..	..	17	8
Thickness of coal sampled.....	5	9	7	8

^a Not included in sample.

^b Not measured.

Section A (sample 15166) was measured in the main entry, 800 feet from the portal.

Section B (sample 15167) was measured at the face of the main entry, 1,600 feet from the portal.

Notes.—The mine is worked by the room-and-pillar system. At the time of sampling the coal was shot down with permissible explosives. None of the coal was shipped as run-of-mine. The coal was screened over bars 18 feet long with 4-inch openings, a shaker screen 14 feet long and 6 feet wide with 2½-inch openings and a shaker screen 14 feet long and 6 feet wide with 1-inch openings. Twenty per cent of the coal passed through the 1-inch screen. This fine coal was wasted, as there was no market for it. The coal was picked or trimmed on the car, and the loaded lump coal had a good appearance. There were three loading tracks with a capacity of 15 empty and 15 loaded cars. The unmined area tributary to this opening was about 1 mile long on the strike of the bed. The daily output was 350 tons.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 61, 421, 422.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 415, 1910, p. 130.

GUNNISON COUNTY.

SOMERSET. SOMERSET MINE.

Sample.—Bituminous coal; Grand Mesa field; analyses Nos. 12322, 12323, and 12324 (p. 25).

Mine.—Somerset; a slope mine in the Somerset district, near Somerset, on the Denver & Rio Grande Railroad.

Coal bed.—Not named. Cretaceous age, Mesaverde formation, Bowie shale. Thickness, 8 to 12 feet. Roof, sandstone; floor, bony coal about 8 inches thick.

The bed was measured and sampled at two points in the mine by J. C. Roberts on June 15, 1911, as described below:

Sections of coal bed in Somerset mine.

Section.....	A	B
Laboratory No.....	12322	12323
Roof, sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 0	3 0
Coal, bony.....	a 0 3	a 0 3
Coal.....	8 9	4 9
Floor, bony coal.....		
Thickness of bed.....	12 0	8 0
Thickness of coal sampled.....	11 9	7 9

a Not included in sample.

Section A (sample 12322) was measured at the face of room 46 off west entry 6, 10,000 feet north of the entry mouth.

Section B (sample 12323) was measured at the face of west entry 9, 4,500 feet north from the mouth.

A composite sample was made by combining face samples 12322 and 12323. The results of an ultimate analysis of this sample are given under laboratory No. 12324.

Notes.—At the time of sampling the coal was shot down with black powder. The output was 1,000 tons a day.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 341, 1909, p. 330.

HUERFANO COUNTY.

OAKVIEW. OAKDALE MINE.

Sample.—Bituminous coal; Trinidad field; analyses Nos. 13526, 13527, 13528, and 13529 (p. 26).

Mine.—Oakdale, a slope and drift mine in the La Veta district, at Oakview, on a spur of the Denver & Rio Grande Railroad, 7 miles west of La Veta.

Coal bed.—Not named. Cretaceous age, Vermejo formation. Average thickness, 12 feet; dip, 15° W.; cleat, north and south. Occasional faults, rolls and horsebacks are encountered. Roof, shale, overlain by sandstone; floor, soft smooth shaly underclay. Particles of both the roof and floor occasionally mixed with the coal in mining. Cover at points of sampling, 100 to 500 feet.

The bed was measured and sampled at three points in the mine by J. C. Roberts on March 8, 1912, as described below:

Sections of coal bed in Oakdale mine.

Section.....	A	B	C
Laboratory No.....	13526	13527	13528
Roof, shale and sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	.. ..	(a)	(a)
Coal, clean.....	13 10	6 6	b 3 6
Natural coke.....	.. ..	.. ..	3 6
Floor, shale.....			
Thickness of coal mined.....	13 10	6 6	7 0
Thickness of coal sampled.....	13 10	6 6	3 6

a Not measured.

b Not included in sample.

Section A (sample 13526) was measured at the face of room 11, off the second "cross," off the main entry.

Section B (sample 13527) was measured at the face of the main entry. The top coal was not mined in advance work and could not be measured.

Section C (sample 13528) was measured at the face of north entry 4. The top coal was not mined in advance work and could not be measured.

A composite sample was made by combining samples 13526 and 13527. The ultimate analysis of this sample is given under laboratory No. 13529.

Notes.—The mine is worked on the room-and-pillar panel system. At the time of sampling the coal was undercut in the coal with punching machines and shot down with black powder. The machine cuttings were loaded with the coal. Twenty-five per cent of the coal was shipped as run-of-mine. The tippie was equipped with two shaking screens each 12 feet long by 5 feet wide, one having 3-inch and the other 1-inch holes, and a revolving screen 12 feet long with $\frac{3}{4}$ -inch holes. Forty per cent of the coal passed through the $\frac{3}{4}$ -inch screen. No pickers were employed at the tippie. There were three loading tracks with a capacity of 20 empty cars and 30 loaded cars. The coal had an excellent appearance and the lumps were large. The average daily production of the mine was 1,200 tons, with a maximum capacity of 1,800 tons. All the coal was from advance workings. The probable life of the mine was 30 years.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 65, 435.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 381, p. 419.

JACKSON COUNTY.

COALMONT. RIACH MINE.

Sample.—Subbituminous coal; North Park field; analysis No. 12601 (p. 26).

Mine.—Riach, a slope mine in the Coalmont district, in the NW. $\frac{1}{4}$ of SW. $\frac{1}{4}$ sec. 24, T. 7 N., R. 81 W.; at Coalmont, on the extension of the Laramie, Hahn's Peak & Pacific Railway.

Coal bed.—Known as the Riach. Late Cretaceous or early Tertiary age, Coalmont formation. Both roof and floor are coal. Thickness, reported 77 feet; dip. 18° north-east.

The bed was sampled at one point in the mine by A. L. Beekly on August 18, 1911. The sample was collected from the north breast on a freshly stripped, fairly dry face, and represents 7 feet of coal.

Notes.—The mine had a capacity of about 800 tons a day. A considerable part of the output was sold for domestic use in the park and in various towns along the main line of the Union Pacific Railroad.

COALMONT. MITCHELL MINE.

Sample.—Subbituminous coal; North Park field; analysis No. 12539 (p. 26).

Mine.—Mitchell; in SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 24, T. 8 N., R. 82 W.; 8 miles northwest of Coalmont and 15 miles southwest of Walden.

Coal bed.—Mitchell. Late Cretaceous or early Tertiary age, Coalmont formation. The bed consists of an upper bench 8 feet thick separated from a lower 2 $\frac{1}{2}$ -foot bench by 10 inches of carbonaceous shale. The shale parting is used as the floor of the mine and about 7 feet of the upper bench is mined, the upper foot being left for roof. Dip, 11° northeast. Strike, north 40° west.

The bed was measured and sampled by A. L. Beekly on August 16, 1911, as described below:

Section of coal bed in the Mitchell mine.

		12539
Laboratory No.		<i>Ft. in.</i>
Roof, dark, micaceous, sandy shale.		3 6
Coal, clean and black.		2 6
Coal, soft and laminated.		2 0
Coal, hard, black.		a 0 10
Shale, carbonaceous, laminated.		a 2 4
Coal, hard.		
Floor, shale.		
Thickness of bed.		11 2
Thickness of coal sampled.		8 0

a Not included in sample.

The sample was collected in the entry, 275 feet northeast of the mine mouth. The mine was worked intermittently.

HIGHO. MONAHAN MINE.

Sample.—Subbituminous coal; North Park field; analysis No. 12540 (p. 26).

Mine.—Monahan, in the SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 31, T. 10 N., R. 81 W., 4 miles northwest of Higho post office and 18 miles northwest of Walden.

Coal bed.—Monahan. Late Cretaceous or early Tertiary age. Thickness, 4 feet 6 inches; strike N. 15° W.; dip, 22° N.; roof, buff shale; floor, sandstone.

The bed was sampled at one point in the mine by A. L. Beekly on August 3, 1911, the sample representing 4 feet 6 inches of coal.

Notes.—The sample was collected from the face of the entry, which was 125 feet long and was on the dip of the bed. The coal at the face was hard, black, and clean.

WALDEN. MCCALLUM MINE.

Sample.—Subbituminous coal; North Park field; analysis No. 12774 (p. 26).

Mine.—McCallum, a slope mine; McCallum anticline district, NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 18, T. 9 N., R. 78 W.; about 5 miles northeast of Walden.

Coal bed.—Sudduth. Late Cretaceous or early Tertiary age. Base of Coalmont formation. Thickness, reported 35 feet; strike, north 50° west; dip, 18° northeast. Both roof and floor are coal.

The bed was sampled by A. L. Beekly on October 16, 1911.

Notes.—The sample was collected from a fresh face in the entry, 50 feet from the foot of the slope, which was 50 feet long and dips 18° . The sample represents 7 feet of coal.

WALDEN. MARR MINE.

Sample.—Subbituminous coal; North Park field; analysis No. 12415 (p. 27).

Mine.—Marr; McCallum anticline district, in the NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 35, T. 9 N., R. 78 W.; $8\frac{1}{2}$ miles east of Walden.

Coal bed.—Sudduth. Late Cretaceous or early Tertiary age, Coalmont formation. The bed is reported to be 53 feet thick and to consist throughout of a good grade of coal, which is free from partings except for several 1-inch sandy layers near the top. Dip, 56° east.

The bed was sampled by A. L. Beekly on June 27, 1911, the sample representing 6 feet of coal.

Notes.—The sample was collected from a clean surface just inside the entry mouth and about 15 feet from the top of the bed. Forty feet of this bed is exposed in an open cut; the base is covered and inaccessible. The mine consisted of two entries; both were filled with water at the time of sampling.

WALDEN. SUDDUTH MINE.

Sample.—Subbituminous coal; North Park field; analysis No. 12414 (p. 27).

Mine.—Sudduth; a drift mine in the McCallum anticline district, in NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 15, T. 9 N., R. 78 W.; $7\frac{1}{2}$ miles east of Walden.

Coal bed.—Sudduth. Late Cretaceous or early Tertiary age, Coalmont formation. Thickness, reported 50 feet; dip, 85° northeast.

The bed was sampled by A. L. Beekly on June 27, 1911.

Notes.—The mine consisted of an entry or room driven horizontally about 70 feet into the bed. The coal exposed in the mine was clean, hard, and glossy black. The sample was collected from a clean face at the end of the entry and represents 20 feet of coal.

WALDEN. WINSKOM MINE.

Sample.—Subbituminous coal; North Park field; analysis No. 12775 (p. 27).

Mine.—Winscom; McCallum anticline district, SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 14, T. 8 N., R. 78 W.; 10 $\frac{1}{2}$ miles southeast of Walden.

Coal bed.—Winscom. Late Cretaceous or early Tertiary age, Coalmont formation. Roof, coal; floor, shale. Strike, nearly north and south. Dip, 25° to 30° east.

The bed was measured and sampled by A. L. Beekly on October 16, 1911, as described below:

Section of coal bed in the Winscom mine.

Laboratory No.	12775
Roof, coal.	<i>Ft. in.</i>
Clay.	a 0 10
Coal.	0 4
Clay, carbonaceous.	a 0 3
Coal.	0 4
Shale, carbonaceous.	a 0 2
Coal.	1 0
Shale, carbonaceous.	a 0 7
Coal.	0 11
Floor, carbonaceous shale.	
Thickness of bed.	4 5
Thickness of coal sampled.	2 7

a Not included in sample.

Notes.—Sample was collected in the entry, 125 feet from the mouth of the mine.

JEFFERSON COUNTY.

MORRISON. WHITE ASH MINE.

Sample.—Subbituminous coal; Denver region; analysis No. 16615 (p. 27).

Mine.—White Ash, a shaft mine in secs. 23, 24, 25, and 26, T. 4 S., R. 70 W., 2 mile. from Morrison, 1 mile from Colorado & Southern Railway switch. Not on any railroads

Coal bed.—Jumbo. Cretaceous age, Laramie formation. Average thickness, 15 feet; dip, 86°. No rolls or horsebacks have been encountered. Roof (hanging wall), clay 3 inches thick, overlain by shale; above the shale is a sandstone cap rock. Small particles of the shale gradually break off on exposure. Floor (foot wall), a hard smooth underclay. Particles of the floor and roof did not mix with the coal in loading.

The bed was measured and sampled at one point in the mine by J. C. Roberts on March 12, 1913, as described below:

Section of coal bed in White Ash mine.

Laboratory No.	16615
Roof, clay and shale.	<i>Ft. in.</i>
Coal.	a 5 6
Coal.	10 6
Floor, underclay.	
Thickness of bed.	16 0
Thickness of coal sampled.	10 6

a Not included in sample.

Sample 16615 was taken in a stope, 30 feet from the second level and 75 feet from the shaft.

Notes.—At the time of sampling the coal was shot off the solid with black blasting powder. The coal was screened through a bar screen 10 feet long with 1-inch openings, about 10 to 15 per cent passing through the screen. No pickers were employed. The coal had a good appearance on the wagons. The area to be mined was approxi-

mately 2 miles long on the strike. The output in the immediate future was to be derived from advance workings.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 381, 1910, p. 297.

LA PLATA COUNTY.

DURANGO. SAN JUAN MINE.

Sample.—Bituminous coal; Durango field; analyses Nos. 14770, 14771, 14772 (p. 27).

Mine.—San Juan, a drift mine $1\frac{1}{4}$ miles southeast of Durango, on the Rio Grande Southern Railroad.

Coal bed.—Not named. Cretaceous age, Mesaverde formation. Thickness, 3 feet 6 inches to 4 feet 10 inches, average about 4 feet. About the middle of the bed is a layer of bony coal 2 inches thick. The roof is a soft gray shale, which slacks on exposure; above the shale is about 10 inches of bony coal. The immediate roof sticks to the coal and often falls in the rooms. The floor is a hard rough shale. Cover at points of sampling, 200 to 225 feet.

The bed was measured and sampled at two points in the mine by W. D. Schofield on September 11, 1912, as described below:

Sections of coal bed in San Juan mine.

Section.....	A	B
Laboratory No.....	14770	14771
Roof, shale, and coal.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 6	4 3
Bone, to shale.....	a 0 1	a 0 2
Coal.....	1 6	0 9
Floor, black shale.....		
Thickness of bed.....	3 1	5 2
Thickness of coal sampled.....	3 0	5 0

a Not included in sample.

Section A (sample 14770) was measured at the face of the main entry, 1,200 feet west of the mine mouth.

Section B (sample 14771) was measured in room 6, off the first dip entry south, 300 feet from the mine mouth.

A composite sample was made by combining and mixing samples 14770 and 14771. The results of an ultimate analysis of this sample are given under laboratory No. 14772.

Notes.—The coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut by hand and shot down with permissible explosives. Dynamite was used for brushing the floor and roof. The undercuttings were loaded out with the coal. About 30 per cent of the output was shipped as run-of-mine. Bar screens 30 feet long with $1\frac{1}{4}$ -inch openings were used; about 60 per cent of the coal passed the screen. The screenings were coked. The loading track had a capacity of 7 cars and the "empty" track 25 cars. The daily output was about 160 tons. About one-half of the output was from advance workings and one-half from pillars. There was about 140 acres to be mined from this opening.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 315, 1910, p. 384.

HESPERUS. HESPERUS MINE.

Sample.—Bituminous coal; Durango field; analyses Nos. 14773, 14774, and 14775 (p. 27).

Mine.—Hesperus, a drift mine in sec. 14, T. 35 N., R. 11 W., at Hesperus, on the Rio Grande Southern Railroad.

Coal bed.—Hesperus. Cretaceous age, Mesaverde formation. Thickness, 4 feet 6 inches to 6 feet; average, about 5 feet. About 2 feet from the roof is an irregular shale parting. The immediate roof is smooth and does not fall in the rooms; the main cap rock is 2 inches to 2 feet above the coal. The floor is a soft smooth clay which mixed with the coal in loading. Cover at points of sampling, about 100 feet.

The bed was measured and sampled at two points in the mine by W. D. Schofield, on September 24, 1912, as described below.

Sections of coal bed in Hesperus mine.

Section.....	A	B
Laboratory No.....	14773	14774
Roof, "draw slate.".....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 2	2 1
Shale, carbonaceous.....	a 0 $\frac{1}{2}$	a 0 1
Coal.....	3 0	2 5
Floor, clay.....		
Thickness of bed.....	5 2 $\frac{1}{2}$	4 7
Thickness of coal sampled.....	5 2	4 6

a Not included in sample.

Section A (sample 14773) was measured at the face of room 3, off right entry 4; 4,000 feet from the mine mouth.

Section B (sample 14774) was measured in room 5, off left entry 5; 4,000 feet west of the mine mouth.

A composite sample was made by combining face samples 14773 and 14774. The results of an ultimate analysis of this sample are given under laboratory No. 14775.

Notes.—The coal is mined by the room-and-pillar system. At the time of sampling, the coal was undercut by hand and broken down with FF black blasting powder. None of the coal was shipped as run-of-mine. Bar screens 8 feet long with 3-inch openings and bar screens 8 feet long with 1-inch openings were used, about 60 per cent of the coal passing through the 1-inch screen. There were three loading tracks with a capacity of 20 loaded cars and 40 empty cars. The daily output was about 200 tons. About 60 per cent of the coal was from advance workings and 40 per cent from pillars. The probable lifetime of the mine is 20 years.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 67, 442.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull 316, 1907, p. 386.

PERINS. PERINS PEAK MINE.

Sample.—Bituminous (coking) coal; Durango field; analyses Nos. 14776, 14777, and 14778 (p. 27).

Mine.—Perins Peak, a drift mine in secs. 11 and 14, T. 35 N., R. 10 W., at Perins, 5 miles southeast of Durango, on a branch of the Rio Grande Southern Railroad.

Coal bed.—Peacock. Cretaceous age, Mesaverde formation. Thickness, 1 foot 6 inches to 6 feet 6 inches. The only impurities are irregular "sulphur" balls in pockets. The immediate roof is good and does not fall in the rooms. The floor is soft and hard shale. Particles of the roof and floor did not mix with the coal in loading. Cover at points of sampling, 70 to 120 feet.

The bed was measured and sampled at two points in the mine by W. D. Schofield on September 17, 1912.

Sample 14776 was cut from the face of room 3, off the main entry, 3,200 feet from the mine mouth. The sample represents 5 feet 1 inch of clear coal.

Sample 14777 was cut from the face of room 13, off the main back entry. The sample represents 5 feet 5 inches of clear coal.

A composite sample was made by combining face samples 14776 and 14777. The results of an ultimate analysis of this sample are given under laboratory No. 14778.

Notes.—The room-and-pillar system of mining is used. At the time of sampling the coal was undercut by hand and broken down with black powder and a permissible explosive. Dynamite was used for brushing the floor and roof. The undercuttings were loaded with the coal. Ninety-five per cent of the coal was shipped as run-of-mine. Ninety per cent of the coal going to the screens passed through. Two bar screens, one being 16 feet long with 8-inch openings and the other 16 feet long with $\frac{3}{4}$ -inch openings, were used. Pickers were employed on the cars. The average daily output was 350 tons. About one-third of the coal was from advance workings and two-thirds from pillars. There was possibly 160 acres of unmined coal. There were three loading tracks, with a capacity of 20 loaded cars and 30 empty cars.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 67, 443.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 316, 1907, p. 386.

LAS ANIMAS COUNTY.

COKEDALE. COKEDALE MINE.

Sample.—Bituminous (coking) coal; Trinidad field; analyses Nos. 11768, 11769, 11770, and 11771 (p. 28).

Mine.—Cokedale, a drift mine in sec. 25, T. 33 S., R. 65 W., at Cokedale, on a branch of the Denver & Rio Grande Railroad.

Coal bed.—Known as the Cokedale. Cretaceous age, Vermejo formation. Average thickness, 6 feet. Roof, sandstone; floor, shale. Cover, 40 to 60 feet.

The bed was measured and sampled at three points in the mine by J. C. Roberts on February 24, 1911, as described below:

Sections of coal bed in the Cokedale mine.

Section.....	A.	B.	C.
Laboratory No.....	11768	11769	11770
Roof, sandstone:	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 4	2 7	2 5
Bone.....	a0 2	0 5	0 7
Coal.....	0 9	0 4	0 7
Bone.....	a0 7	a1 2	a0 3
Coal.....	2 3	0 7	2 3
Bone.....	.. ..	a0 6	.. ..
Coal.....	.. ..	0 4	.. ..
Bone.....	.. ..	a0 1 $\frac{1}{2}$	.. ..
Coal.....	.. ..	0 10	.. ..
Floor, shale:			
Thickness of bed.....	6 1	6 10 $\frac{1}{2}$	6 1
Thickness of coal sampled.....	5 4	4 9 $\frac{1}{2}$	5 3

a Not included in sample.

Section A (sample 11768) was measured at the face of room 8, off west entry 4.

Section B (sample 11769) was measured at the face of room 21, off west entry 1.

Section C (sample 11770) was measured at the face of room 10, off west entry 6.

A composite sample was made by combining face samples 11768, 11769, and 11770. The results of an ultimate analysis of this sample are given under laboratory No. 11771.

Notes.—At the time of sampling the output was 1,200 tons a day.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 69, 447.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 381, 1910, p. 399.

DELAGUA. DELAGUA MINE.

Sample.—Bituminous (coking) coal; Trinidad field; analyses Nos. 11435, 11436, 11437, and 11443 (p. 28).

Mine.—Delagua, a shaft mine in sec. 15, T. 31 S., R. 65 W., at Delagua, 20 miles north of Trinidad, on the Colorado & Southeastern Railway.

Coal bed.—Known as the Delagua. Cretaceous or Tertiary age, Raton formation. Thickness, 5 feet to 6 feet. Roof, shale 12 to 20 inches thick. Cover at points of sampling, 450 to 500 feet.

The bed was measured and sampled at three points in the mine by J. C. Roberts on December 9, 1910, as described below:

Sections of coal bed in the Delagua Mine.

Section.....	A	B	C
Laboratory No.....	11435	11436	11437
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 10	6 6	2 8
Bone.....	0 1	.. ..	a 0 4
Coal.....	2 9½	.. ..	2 8
Floor, not stated.....			
Thickness of bed.....	5 8	6 6	5 8
Thickness of coal sampled.....	5 8	6 6	5 4

a Not included in sample.

Section A (sample 11435) was measured at the face of room 1, east entry 24, off north entry 3.

Section B (sample 11436) was measured at the face of east entry 18, off north entry 4.

Section C (sample 11437) was measured at the face of room 5, west entry 3, off north entry 4.

A composite sample was made by combining face samples 11435, 11436, and 11437. The results of an ultimate analysis of this sample are given under laboratory No. 11443.

Notes.—At the time of sampling the output was 1,000 to 1,500 tons a day.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 69, 448.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 381, p. 410.

For results of tests of other coal from this mine see mention of specific tests as follows—Washing tests: U. S. Geol. Survey Bull. 368, p. 27; coking tests: U. S. Geol. Survey Bull. 368, p. 39.

FORBES. FORBES NO. 9 (OR COX) MINE.

Sample.—Bituminous coal; Trinidad field; analyses Nos. 11926, 11927, 11929, and 11930 (pp. 28 and 29).

Mine.—Forbes, a drift mine in secs. 15 and 16, T. 32 S., R. 64 W., at Forbes, on a spur of the Denver & Rio Grande Railroad.

Coal bed.—Walsen. Cretaceous age, Vermejo formation. Average thickness about 4 feet; dip 1° southwest. One fault showing a displacement of 3 feet has been found. The roof is a hard, smooth, dark-gray shale, overlain by sandstone. The floor is a thin, hard, smooth shale, underlain by 18 inches of coal; beneath the coal is shale. Cover at points of sampling, 300 to 400 feet.

The bed was measured and sampled at three points in the mine by J. C. Roberts on March 16, 1911.

Sample 11926 was cut from the face of the first crosscut, off west entry 1; 2,800 feet southwest of the slope opening. The sample represents 4 feet 4 inches of clean coal.

Sample 11927 was cut from the face of west entry 6; 3,800 feet southwest of the slope opening. The sample represents 3 feet 9 inches of clean coal.

Sample 11929 was taken in room 6, off west entry 4; 3,200 feet southwest of the slope opening. The sample represents 3 feet 11 inches of clean coal.

A composite sample was made by combining face samples 11926, 11927, and 11929. The results of an ultimate analysis of this sample are given under laboratory No. 11930.

Notes.—The room-and-pillar system of mining is employed. At the time the mine was visited the coal was undercut by hand and broken down with black powder; "40 per cent" dynamite was used for brushing the roof and taking up the bottom. Nearly 95 per cent of the coal was shipped as run-of-mine. The coal was friable, about 38 per cent passing through a 2-inch screen. Pickers were employed on the cars in loading. There were three loading tracks, with a capacity of 30 empty cars and 60 loaded cars. About 80 per cent of the coal was recovered, 40 per cent being from advance workings and 40 per cent from pillar workings. The daily output was 600 to 700 tons.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 381, 1910, p. 402.

HASTINGS. HASTINGS MINE.

Sample.—Bituminous (coking) coal; Raton Mesa field; analyses Nos. 12028, 12029, and 12031 (p. 29).

Mine.—Hastings, a slope mine in sec. 25, T. 32 S., R. 64 W., at Hastings, on the Colorado & Southeastern Railroad, with connections to the Colorado & Southern Railway and the Denver & Rio Grande Railroad.

Coal bed.—Berwind (?) and Hastings. Cretaceous age, Vermejo formation.

The Hastings bed averages about 8 feet in thickness and dips 5° west. The roof and floor are shale. Cover at points of sampling, about 800 feet.

The bed was measured and sampled at two points in the mine by J. C. Roberts on April 6, 1911, as described below:

Section of Hastings bed in Hastings mine.

Laboratory No.....	12028	
	<i>Ft.</i>	<i>in.</i>
Roof, shale.....	6	0
Coal.....	a1	0
Coal, bony.....	3	5
Floor, shale.....		
Thickness of bed.....	10	5
Thickness of coal sampled.....	9	5

a Not included in sample.

The sample was measured on the pillar between south entries 7 and 8, 8,300 feet from the mouth of the slope.

Sample 12031 was taken in south entry 7, at the fifth crosscut, 8,200 feet from the mouth of the slope.

The Berwind (?) bed is about 40 feet below the Hastings. The roof is sandstone; it is smooth and does not adhere to the coal in mining. The floor is a hard, smooth sandstone. The cover is 800 feet thick.

The bed was measured and sampled at one point in the mine by J. C. Roberts on April 6, 1911, as described below:

Section of Berwind (?) bed in Hastings mine.

Laboratory No.....	12029	
	<i>Ft.</i>	<i>in.</i>
Roof, sandstone.....	1	0
Coal.....	0	1
Coal, bony.....	0	6
Coal.....	0	1
Coal, bony.....	0	1
Coal.....	0	6
Coal, bony.....	0	1
Coal.....	2	10
Floor, sandstone.....		
Thickness of bed.....	5	1
Thickness of coal sampled.....	5	1

The above section (sample 12029) was measured at the face of the slope.

Notes.—The double entry, room-and-pillar system of mining is used. At the time of sampling, the coal was undercut with electric chain cutters and shot down with a permissible explosive.

None of the coal was sold as run-of-mine. The coal was screened over a 2½-inch bar screen, about 50 per cent passing through the screen. The screenings were washed with Stewart jigs and yielded a 2-inch product and slack. The capacity of the washery was 400 tons a day. There were coke ovens with a capacity of 300 tons and storage bins with a capacity of 500 tons. There were two loading tracks capable of handling 150 empty and 150 loaded cars.

The capacity of the mine was 1,000 tons a day. There was 640 acres of unmined coal tributary to the main entry.

For results of tests of other coal from this mine, see mention of specific tests, as follows: Washing tests, U. S. Geol. Survey Bull. 368, p. 27; coking tests, U. S. Geol. Survey Bull. 368, p. 45.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 69, 449.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 381, 1910, p. 404.

MORLEY. MORLEY MINE.

Sample.—Bituminous (coking) coal; Trinidad field; analyses Nos. 13361, 13362, 13363, and 13364 (p. 29).

Mine.—Morley, a drift and slope mine at Morley, on the main line of the Atchison, Topeka & Santa Fe Railway.

Coal bed.—Known as the Engle-Starkville. Cretaceous age, Vermejo formation. Average thickness, 4 to 7 feet; dip, 15° to 18° west. The roof is a shale about 18 inches thick; above the shale is sandstone. Floor, shale or sandstone. Particles from the roof and floor did not mix with the coal in mining. The cover at points of sampling ranges from 250 to 450 feet.

The bed was measured and sampled at three points in the mine by J. C. Roberts on February 17, 1912, as described below:

Sections of coal bed in Morley mine.

Section.....	A	B	C
Laboratory No.....	13361	13362	13363
Roof, 18 inches of coal left for safety; shale and sandstone above.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 0	0 11	5 1
Shale, soft.....	0 2	0 1	.. ..
Coal.....	3 1	5 1	.. ..
Floor, shale and sandstone.			
Thickness of coal mined.....	5 3	6 1	5 1
Thickness of coal sampled.....	5 3	6 1	5 1

Section A (sample 13361) was measured at the face of room 2, off third plane, off right entry 4.

Section B (sample 13362) was measured at the face of fifth left entry.

Section C (sample 13363) was measured at the face of fourth right entry; 3,000 feet from the mine mouth.

A composite sample was made by combining and mixing face samples 13361, 13362, and 13363. The results of an ultimate analysis of this sample are given under laboratory No. 13364.

Notes.—The Morley mine is opened on the east side by a drift and on the west side by a slope. The room-and-pillar system of mining is used. At the time of sampling the coal was undercut by hand and broken down with a permissible explosive, which was also used for brushing the roof. Seventy-five per cent of the coal was

shipped as run-of-mine, and 25 per cent was screened. Shaker screens, 16 feet long by 6 feet wide, with 3-inch and 1½-inch holes were used; 60 per cent passed through the screens. Pickers were employed in loading screened coal on the cars. The lumps were of medium size and of good appearance. The screenings were coked; they were not washed before coking. There was no storage bin at this mine. There were two tracks, with a capacity of 45 empty and 45 loaded cars. The probable lifetime of the mine is about 25 years.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 69, 450.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 381, 1910, p. 424.

PRIMERO. FIRST EAST, FIRST WEST, AND FIRST NORTH PRIMERO MINES.

Sample.—Bituminous coal; Trinidad field; analyses Nos. 12025, 12027, W31033 to W31043, 14058, 14059, 14060, W31131 to W31151 (pp. 29–32).

Mines.—First East, First West, and First North Primero, drift mines, in secs. 23, 24, 25, and 26, T. 33 S., R. 66 W., at Primero, on the Colorado & Wyoming Railway.

Coal bed.—Primero. Cretaceous or Tertiary age, Raton formation. Average thickness, 7 feet; dip, 4° northwest. Faults, rolls, and horsebacks are frequent. The roof is a hard black shale; above the shale is a sandstone cap rock. Particles of the shale mix with the coal in mining. The floor is a soft smooth shale, particles of which occasionally mix with the coal in mining. The cover at points of sampling to ranges from 50 to 500 feet at the First West mine; from 500 to 550 feet at the First North mine; and from 600 to 850 feet at the First East mine.

The bed was measured and sampled at 16 points in the mine as follows: 2 points on March 25, 1911, by J. C. Roberts; 5 points in the First West Primero mine on May 16, 1912; 3 points in the First North Primero mine on May 19, 1912; and 6 points in the First East Primero mine on May 19, 1912, by J. C. Roberts and W. D. Schofield; also 9 sets of duplicate samples were taken from cars that were being loaded on May 16 to 19, inclusive, 1912, as described below:

Sample 12025 was cut from the face of room 1, off the second blind back entry. The bed at this point was 5 feet 10 inches thick, all of which was included in the sample.

Sample 12027 was cut from the face of the first west slope, 1,500 feet from the drift mouth.

Sections of coal bed in First East Primero mine.

Section.....	A		B		C	
Laboratory No.....	W31144		W31145		W31146	
Roof, "draw slate" and sandstone.....	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Coal.....	0	11	0	9	1	0
Shale.....	0	½	0	½	0	½
Coal.....	1	0	3	10	1	2½
Shale.....	0	½	..	..	..	..
Natural coke.....	..	..	0	1½	0	1
Coal.....	3	1	1	8	3	7
Floor, shale.....	..	..	..	..	..	..
Thickness of bed.....	5	1	6	5	5	11
Thickness of coal sampled.....	5	1	6	5	5	11

Section A (sample W31144) was measured on a pillar of room 5, off entry B-9, off first blind entry.

Section B (sample W31145) was measured on a chain pillar of east entry B-9.

Section C (sample W31146) was measured at the face of room 4, off east entry B-10.

Sample W31143 was measured on a pillar of right entry 6, between rooms 1 and 2, off third blind entry, off entry B-8. The bed measured 6 feet 1 inch at this point, all of which was included in the sample.

Sample W31147 was measured at the face of room 3, off eleventh east entry. The bed measured 7 feet 4 inches at this point, all of which was included in the sample.

Sample W31149 was measured on a chain pillar of third blind entry, off east entry B-10. The bed measured 7 feet at this point, all of which was included in the sample.

A composite sample was made by mixing face samples W31143, W31144, W31145, W31146, W31147, and W31149. The results of an ultimate analysis of this sample are given under laboratory No. 14060.

Sections of coal bed in First North Primero mine.

Section.....	A	B	C
Laboratory No.....	W31148	W31150	W31151
Roof, "draw slate" and sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 4	.. ..	.. ..
Bone.....	0 1	0 6	.. ..
Coal.....	1 11	2 0	3 5
Bone or "sulphur".....	0 1	a 0 1	a 0 1½
Coal.....	0 2	.. ..	.. ..
Shale.....	0 ½	.. ..	.. ..
Coal.....	2 8	2 2	.. ..
Bone.....	0 ½	0 ½	.. ..
Coal.....	2 8	2 2½	3 7½
Floor, underclay:			
Thickness of bed.....	7 11	7 0	7 2
Thickness of coal sampled.....	7 11	6 11	7 ½

a Not included in sample.

Section A (sample W31148) was measured at the face of room 5, off third back entry, off entry A-12.

Section B (sample W31150) was measured on a pillar of room 7, off entry A-12.

Section C (sample W31151) was measured at the face of entry B-9.

A composite sample was made by combining face samples 31148, 31150, and 31151. The results of an ultimate analysis of this sample are given under laboratory No. 14059.

Sections of coal bed in First West Primero mine.

Section.....	A	B	C	D	E
Laboratory No.....	W31039	W31040	W31041	W31042	W31043
Roof, sandstone and "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 8	2 5	.. ..	.. ..	.. ..
Bone.....	0 ½	0 1	.. ..	.. ..	.. ..
Coal.....	0 8	0 1	.. ..	.. ..	.. ..
Bone, "sulphur" band.....	a 0 1½	0 ½	.. ..	.. ..	.. ..
Coal.....	1 7	0 6½	.. ..	.. ..	.. ..
Shale.....	a 0 2	0 ½	.. ..	.. ..	.. ..
Coal.....	.. ..	0 8	0 11	2 2½	2 10
Natural coke.....	.. ..	.. ..	.. ..	a 0 4½	.. ..
Shale.....	.. ..	0 1	a 0 2	.. ..	0 1
Coal.....	1 6	1 5	3 8	2 5	2 1
Floor, clay and sandstone.					
Thickness of bed.....	4 9	5 4	4 9	5 0	5 0
Thickness of coal sampled.....	4 5½	5 4	4 7	4 7½	5 0

a Not included in sample.

Section A (sample W31039) was measured at the face of north entry 2.

Section B (sample W31040) was measured at the face of room 10, off first north entry.

Section C (sample W31041) was measured at the face of room 9, off second south entry.

Section D (sample W31042) was measured at the face of room 5, off first right entry, off the first west air course.

Section E (sample W31043) was measured at the face of room 17, off second right entry, off the first west air course.

A composite sample was made by combining and mixing face samples 31039 to 31043, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 14058.

Nine samples were taken in duplicate at the mine from the cars while being loaded. Fifty pounds of coal was taken from each of four cars. The four lots were combined, quartered, and sampled in duplicate.

Duplicate samples W31033 and W31034, W31035 and W31036, W31131 and W31132, W31133 and W31134, W31135 and W31136, W31137 and W31138, and W31141 and W31142, were taken from four cars; duplicate samples W31139 and W31140 were taken from one car only; 29 cars being sampled in all.

Notes.—The Primero mines are worked on the room-and-pillar system. At the time of sampling the coal was undercut by hand. Permissible explosives were used for breaking down the coal and for brushing the floor and roof. When the mine was sampled in 1912, all the coal was shipped as run-of-mine, but when screened, 65 per cent of the coal passed through. The screens were bars 18 feet long spaced $1\frac{1}{2}$ inches apart. The screenings were washed and coked at Segundo, the capacity of the coking plant being 1,300 tons a day and the capacity of the washery 1,600 tons a day. Pickers were employed on the cars. The lumps on the cars were of medium size and of good appearance. There were four loading tracks with a capacity of 80 empty and 80 loaded cars. The daily average output was 1,200 tons of coal with a capacity of 1,600 tons. Seventy-five per cent of the output was from pillars and 25 per cent from advance workings. The probable lifetime of the mine was 25 years.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 69–70, 450–451.

For results of tests of coal from this mine see mention of specific tests as follows—Washing tests: Bureau of Mines Bull. 5, p. 32; coking tests: Bureau of Mines Bull. 5, p. 44.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 381, 1910, p. 426.

STARKVILLE. STARKVILLE MINE.

Sample.—Bituminous (coking) coal; Trinidad field; analyses Nos. 11134, 11135, 12196, 12197, and 12198 (p. 32).

Mine.—Starkville, a drift mine at Starkville, on the main line of the Atchison, Topeka & Santa Fe Railway.

Coal bed.—Engle-Starkville. Cretaceous age, Vermejo formation. Average thickness, 6 feet; dip 1° southwest. Roof, smooth shale overlain by sandstone; floor, hard rough shale; cover, at points of sampling, 150 to 550 feet.

The bed was measured and sampled at two points in the mine by H. M. Wolfelin (Nos. 11134 and 11135) on October 20, 1910, and at two points by J. C. Roberts (Nos. 12196 and 12197) on May 9, 1911, as described below:

Sections of coal bed in Starkville mine.

Section.....	A 11134	B 11135	C 12196	D 12197
Laboratory No.....	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, shale and sandstone.....				
Bone.....	0	3	..	..
Coal, clean and bright.....	0	7	0	6
Shale.....	0	$\frac{1}{2}$	..	..
Coal, clean.....	1	$\frac{3}{4}$	..	..
Coal, hard and bright.....	0	$\frac{1}{2}$	0	$\frac{1}{2}$
Coal, clean.....	1	$2\frac{1}{2}$	1	3
Bone.....	a0	$2\frac{1}{2}$	..	..
Coal, clean.....	0	7	..	..
Bone.....	a0	$1\frac{1}{2}$	a0	$1\frac{1}{2}$
Coal, bright.....	1	5	..	..
Bone.....	0	$3\frac{1}{2}$	..	..
Shale.....	a0	$1\frac{1}{2}$	..	..
Coal, clean.....	1	$4\frac{1}{2}$	1	2
Floor, shale.....			5	9
Thickness of bed.....	7	$2\frac{1}{2}$	3	1
Thickness of coal sampled.....	6	$9\frac{1}{8}$	2	$11\frac{1}{2}$
			5	9
			4	2

a Not included in sample.

Section A (sample 11134) was measured on the rib of west entry 8, 30 feet outby slant from new entry.

Section B (sample 11135) was measured in south entry 3 near the second crosscut from the new entry.

Section C (sample 12196) was measured in entry I-5 on the pillar between rooms 26 and 27, 15,000 feet southwest of the opening.

Section D (sample 12197) was measured at the face of south entry 1, 1,200 feet southeast of the mouth of the main drift.

A composite sample was made from face samples 12196 and 12197. The results of an ultimate analysis of this sample are given under Laboratory No. 12198.

Notes.—The room-and-pillar system of mining is used. At the time of sampling the coal was undercut by hand; no explosives were used for breaking down the coal. A large part of the output was sold as run-of-mine. About 70 per cent of the coal going to the screens passed through a 2½-inch bar screen; pickers were employed on the cars. The screenings were washed; the capacity of the washery was 700 tons a day; coke ovens, 600 tons; storage bins, 1,400 tons. There were three loading tracks with a capacity of 70 empty and 70 loaded cars.

The average output was 900 tons a day; unmined area, 640 acres.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 381, 1910, p. 396.

TOLLERBURG. TOLLER MINE.

Sample.—Bituminous coal; Trinidad field; analyses Nos. 13253 and 13254 (p. 32).

Mine.—Toller, a shaft mine near Tollerburg, on a spur of the Colorado & Southern Railway.

Coal bed.—Berwind. Cretaceous age, Vermejo formation. Average thickness, 6 feet; dip, 4 to 5 per cent, southwest; cleat, east, and west. Faults, rolls and horsebacks occur frequently. The roof is a hard shale which in places is full of slips. Above this shale is 15 inches of good quality of roof coal; above the roof coal is a cap rock, the cap rock being 5 to 6 feet above the coal mined. The floor is a soft smooth sandstone. Neither the roof nor floor materials mixed with the coal in mining. Cover, at points of sampling, 400 to 450 feet.

The bed was measured and sampled at two points in the mine by J. C. Roberts on January 8, 1912, as described below:

Sections of coal bed in Toller mine.

Section.....	A		B	
	13253		13254	
Laboratory No.....	Ft. in.		Ft. in.	
Roof, shale.....				
Coal, clean.....	7	0	1	3
Bone.....			0	4
Coal, clean.....			5	5
Floor, shale.....				
Thickness of bed.....	7	0	7	0
Thickness of coal sampled.....	7	0	7	0

Section A (sample 13253) was measured at the face of the slope, 2,500 feet from the shaft bottom.

Section B (sample 13254) was measured at the face of north entry 5, 3,000 feet from the shaft bottom.

Notes.—The shaft is 350 feet deep. The coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut by hand. Permissible explosives were used for breaking down the coal and for brushing the roof and floor. Ninety per cent of the coal was shipped as run-of-mine. The tippie had shaker screens 15 feet long by 5 feet wide with 3-inch holes. Pickers were employed on the cars in loading.

The lumps were of medium size and had a good appearance. There were three tracks with a capacity of 30 empty cars and 25 loaded cars. The average daily production was 700 tons, with a capacity of 900 tons. Three-fourths of the coal was from advance workings and one-fourth from pillars. About 400 acres remain to be mined.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 381, 1910, p. 403.

MESA COUNTY.

GRAND JUNCTION. PROSPECT.

Sample.—Bituminous coal; Gunnison Valley field; analyses Nos. 11108 and 11109 (p. 33).

Mine.—Prospect, near the junction of the Grand and Gunnison Rivers in sec. 26, T. 1 S., R. 1 W., 1 mile south of Grand Junction, which is the nearest station on the Denver & Rio Grande Railroad.

Coal bed.—Unnamed. Cretaceous age, Dakota (?) formation. Thickness, about 3 feet. Both the roof and floor are carbonaceous shale. Cover, about 30 feet.

The bed was measured and samples were taken at one point in the mine by E. G. Woodruff on October 20, 1910, as described below:

Sections of coal bed in prospect near Grand Junction.

Section.....	A	B
Laboratory No.....	11108	11109
Roof, carbonaceous shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 11	a 1 11
Shale.....	a 0 1	a 0 1
Coal.....	a 0 10	0 10
Floor, carbonaceous shale.		
Thickness of bed.....	2 10	2 10
Thickness of coal sampled.....	1 11	0 10

a Not included in sample.

The above samples were taken in the entry, about 125 feet from the mouth of the entry. At the time the samples were taken the prospect was not being worked.

Note.—The coal is hard and black and looks like good coal, but contains a very high percentage of ash.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 471, 1912, p. 568.

GRAND JUNCTION. PROSPECT.

Sample.—Subbituminous coal; Gunnison Valley region; analyses Nos. 11104 and 11105 (p. 33).

Mine.—A prospect opening between Grand Junction and White Water, in sec. 5; T. 2 S., R. 1 E., 5 miles southeast of Grand Junction, which is the nearest station on the Denver & Rio Grande Railroad.

Coal bed.—Unnamed bed. Cretaceous age, Dakota (?) formation. Thickness, 2 feet 6 inches. Roof, sandstone; floor, carbonaceous shale.

The bed was measured and samples were taken from one point in the mine by E. G. Woodruff on October 10, 1910, as described below:

Sections of coal bed in prospect, 5 miles south of Grand Junction.

Section.....	A	B
Laboratory No.....	11104	11105
Roof, sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 3	a 1 3
Shale, gray.....	a 0 3	a 0 3
Coal.....	a 1 0	1 0
Floor, carbonaceous shale.		
Thickness of bed.....	2 6	2 6
Thickness of coal sampled.....	1 3	1 0

a Not included in sample.

Both of these samples were taken in the entry, about 100 feet from the mouth of the entry. At the time of sampling this prospect was not being worked.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 471, 1910, p. 569.

MOFFAT COUNTY.

AXIAL. BATTLE ERA MINE.

Sample.—Bituminous coal; Danforth Hills field; analysis No. 14528 (p. 33).

Mine.—Battle Era; NW. $\frac{1}{4}$ sec. 14, T. 4 N., R. 94 W.; in Morgan Gulch, 6 miles west of Axial, 59 miles west and 14 miles south of the terminus of the Denver & Salt Lake Railroad.

Coal bed.—No name. Cretaceous age, Mesaverde formation. Dip, $8\frac{1}{2}^{\circ}$ south.

The bed was measured and sampled at one point in the mine on July 29, 1912, by E. T. Hancock, as shown below:

Section of coal bed in Battle Era mine.

Laboratory No.	14528
Roof, sandy shale.	<i>Ft. in.</i>
Coal.	2 $\frac{1}{2}$
Shale, carbonaceous.	a 0 6
Coal.	8 11 $\frac{1}{2}$
Floor, carbonaceous shale.	
Thickness of bed.	11 6
Thickness of coal sampled.	11 0

a Not included in sample.

The sample was taken in the entry 130 feet northeast of the mine mouth.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 415, 1910, p. 167.

AXIAL. ED COLLOM MINE.

Sample.—Bituminous coal; Danforth Hills field; analysis No. 14529 (p. 33).

Mine.—Ed Collom; SW. $\frac{1}{4}$ sec. 13, T. 4 N., R. 94 W.; in Collom gulch, $5\frac{1}{2}$ miles northwest of Axial, 14 miles south and 56 miles west of the terminus of the Denver & Salt Lake Railroad.

Coal bed.—No name. Cretaceous age, Mesaverde formation. Dip, about 40° southwest.

The bed was measured and sampled at one point in the mine by E. T. Hancock on July 29, 1912.

The sample was taken in the mine 75 feet northwest of the mine mouth.

The bed was 13 feet 6 inches thick at the point sampled, all of which was included in the sample. The roof was shaly sandstone, the floor was carbonaceous shale. The coal was mined for local use only.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 415, 1910, p. 173.

AXIAL. JAMES MINE.

Sample.—Bituminous coal; Danforth Hills field; analysis No. 12704 (p. 33).

Mine.—James; in sec. 14, T. 3 N., R. 93 W.; on Spring Creek, 4 miles south of Axial, on the Meeker-Axial stage road.

Coal bed.—No name. Cretaceous age; Mesaverde formation. Dip, 13° S., 66° E.

The bed was measured and sampled on October 9, 1911, by E. T. Hancock.

The sample was taken in the main entry 100 feet north of the mine mouth, in 6 feet 4 inches of coal. There was coal above the part sampled. The floor was brown shale.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 79, 476.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 415, 1910, p. 168.

AXIAL. JOE COLLOM MINE.

Sample.—Bituminous coal; Danforth Hills field; analysis No. 14543 (p. 33).

Mine.—Joe Collom; SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 2, T. 3 N., R. 93 W.; on Spring Creek, $1\frac{1}{2}$ miles south of Axial; 65 miles north of the Denver & Rio Grande Railroad.

Coal bed.—Collom. Cretaceous age; Mesaverde formation. Dip, $3\frac{1}{2}^{\circ}$ S., 29° W.

The bed was measured and sampled at one point in the mine on July 30, 1912, by E. T. Hancock, as described below:

Section of coal bed measured near opening of Joe Collom mine.

Laboratory No.	14543
Roof, brown shale.	<i>Ft. in.</i>
Coal.	a 6 $\frac{9}{2}$
Shale, brown, sandy.	a 0 $\frac{1}{2}$
Coal.	a 4 $\frac{1}{2}$
Coal.	8 11
Floor, brown shale.	
Thickness of bed.	20 $\frac{1}{2}$
Thickness of coal sampled.	8 11

a Not included in sample.

Only 8 feet 11 inches of the lower bench of the coal bed was exposed in the mine. Only that portion was sampled. The sample was taken 400 feet northwest of the mine mouth.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 79, 476.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 415, 1910, p. 167.

AXIAL. SHAFER MINE.

Sample.—Bituminous coal; Danforth Hills field; analysis No. 14909 (p. 33).

Mine.—Shafer; sec. 31, T. 4 N., R. 92 W.; on Milk Creek, 2 miles east of Axial, 50 miles west and 16 miles south of the western terminus of the Denver & Salt Lake Railroad.

Coal bed.—No name. Cretaceous age; Mesaverde formation. Dip, 34° S., 50° E.

The bed was measured and sampled at one point in the mine on October 11, 1912, by E. T. Hancock, as shown below:

Section of coal bed in Shafer mine.

Laboratory No.	14909
Roof, brown shale.	<i>Ft. in.</i>
Coal.	9 6
Coal, impure.	0 6
Coal.	3 9
Shale, black, carbonaceous (3 inches).	
Floor, brown shale.	
Thickness of bed.	13 9
Thickness of coal sampled.	13 9

The sample was taken in the mine 189 feet northeast of the mine mouth.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 415, p. 170.

CRAIG. WALKER MINE.

Sample.—Subbituminous coal; Yampa field; analysis No. 12400 (p. 33).

Mine.—Walker; sec. 17, T. 6 N., R. 90 W.; about 3 miles southeast of Craig, not on any railroad.

Coal bed.—Unnamed. Cretaceous age, Mesaverde formation. The coal is 8 feet thick and very free from foreign matter. The bed was sampled at one point in the mine by A. J. Hazelwood on June 20, 1911.

The sample was cut from the face of the main entry, 300 feet west of the opening.

Notes.—The Walker mine is an old country bank and had been in operation 20 to 30 years. At the time of sampling the coal was run out of the mine in cars and dumped into wagons. The coal was used entirely for domestic purposes. The coal was screened in the mine by means of forks and the fine coal was left in the gob. It was estimated that there was about 1,000 tons of slack in the worked-over parts of the mine. About one-fifth of the coal is slack. The output averaged approximately 20 tons per month. There was 1,000 acres of coal tributary to this opening.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 297, 1906, p. 62.

MONTEZUMA COUNTY.

CORTEZ. CORTEZ MINE.

Sample.—Bituminous coal; Ute Mountain-Mancos field; analysis No. 12785 (p. 33).

Mine.—Cortez; NW. $\frac{1}{4}$ sec. 23, T. 36 N., R. 16 W.; one-half mile west of Cortez.

Coal bed.—The lowest bed in the Dakota formation; Cretaceous age. Dip 6°, northwest. In many places this bed is about 2 feet thick and exceeds that thickness only locally. The coal is extremely irregular in character, and sections taken only a few feet apart may not be alike. In many places the roof is sandstone, at other places it is shale, the shale is only a few inches, scarcely ever over 1 foot thick. Sandstone lenses interbedded with the coal are not uncommon.

The bed was measured and sampled at one point in the mine on October 20, 1911. by F. M. Handy and M. A. Pishel, as shown below:

Section of coal bed in Cortez mine.

Laboratory No.....	12785
Roof, sandstone.....	<i>Ft. in.</i>
Coal, bony.....	0 6
Clay.....	a 0 6
Shale.....	a 0 11½
Bone.....	a 0 4
Coal, bony.....	a 0 7½
Coal.....	0 2
Bone.....	a 0 2½
Coal.....	0 11
Bone.....	a 0 6
Floor, shale.....	
Thickness of bed.....	4 8½
Thickness of coal sampled.....	1 7

a Not included in sample.

Notes.—The mine is small and is worked intermittently for local trade. No one was at the mine at the time the sample was taken. There were no screens at the mine; the entire output being loaded as run-of-mine coal. The sample is probably slightly weathered.

CORTEZ. HAMILTON PROSPECT.

Sample.—Bituminous coal; Ute Mountain-Mancos field; analysis No. 12686 (p. 33).

Mine.—Hamilton prospect; in SE. $\frac{1}{4}$ sec. 3, T. 35 N., R. 18 W., 16 miles southwest of Cortez.

Coal bed.—Unnamed bed. Cretaceous age, Dakota formation. The bed lies nearly horizontal, in many places is about 2 feet thick and exceeds that thickness only locally. The coal is extremely irregular in character and sections taken only a few feet apart may not be alike. The roof is sandstone; at places the sandstone is replaced

by shale, which is only a few inches, scarcely ever over 1 foot thick. It is not uncommon to find sandstone lenses interbedded with the coal.

The bed was measured and sampled at one point in the mine on September 17, 1911, by M. A. Pishel, as shown below:

Section of coal bed in Hamilton prospect, about 16 miles southwest of Cortez.

Laboratory No.....	12686
Coal.....	<i>Ft. in.</i> 0 6
Shale.....	α 0 4
Bone.....	α 0 7
Coal, bony.....	0 7
Bone.....	α 0 1
Coal.....	0 6
Bone.....	α 0 1
Thickness of bed.....	2 8
Thickness of coal sampled.....	1 7

α Not included in sample.

The sample was taken near the surface in an open cut.

Notes.—This prospect was within a mile of an igneous sheet and it is probable that this sheet extended over the bed only a short distance above the coal. The coal at the prospect had a semimetallic luster resembling semianthracite, whereas the coal of this bed in the neighborhood of Cortez has the appearance of typical bituminous coal. It is probable that this phenomenon is due to the proximity of this prospect to the igneous sheet referred to above.

CORTEZ. JACKSON MINE.

Sample.—Bituminous coal; Ute Mountain-Mancos field; analyses Nos. 16472, 16473, 16474, and 16475 (p. 34).

Mine.—Jackson, a drift mine in the SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 33, T. 35 N., R. 16 W., 10 miles southeast of Cortez, in the Mesa Verde National Park. There are no railroad connections.

Coal bed.—Lower bed of the Mesaverde formation, possibly the Spencer bed; Cretaceous age. Average thickness, 2 feet 8 inches; dip, 2° southwest; cleat, northeast and southwest. Faults, rolls, and horsebacks occur frequently. The roof is a hard blue shale; above the shale is a sandstone cap rock. Floor is hard smooth shale. Cover at points of sampling, 30 feet.

The bed was measured and sampled at three points in the mine by J. C. Roberts on February 13, 1913, as described below:

Sections of coal bed in Jackson mine.

Section.....	A 16472	B 16473	C 16474
Laboratory No.....	<i>Ft. in.</i> 2 10	<i>Ft. in.</i> 2 7	<i>Ft. in.</i> 2 7
Roof, sandstone.....	.. ..	.. ..	α 1 8
Coal.....	.. ..	.. ..	α 1 0
Shale and sandstone.....	.. ..	.. ..	.. ..
Floor, shale.....	2 10	2 7	5 3
Thickness of bed.....	2 10	2 7	2 7
Thickness of coal sampled.....	.. ..	.. ..	.. ..

α Not included in sample.

Section A (sample 16472) was measured at the face of room 4, off the north entry, 200 feet from the mine mouth.

Section B (sample 16473) was measured at the face of the main entry, 170 feet north of the mine mouth.

Section C (sample 16474) was measured at the face of the south entry, 95 feet from the mine mouth.

A composite sample was made by mixing samples 16472, 16473, and 16474. The results of an ultimate analysis of this sample are given under laboratory No. 16475.

Notes.—The mine is worked on the room-and-pillar system. At the time of sampling the development consisted of a pair of entries driven slightly north of east with four rooms turned. The coal was undercut by hand and shot down with black blasting powder. The coal was screened over a "grizzly" with wood bars 2 inches by 4 inches by 10 feet long spaced three-fourths inch apart. The coal was used entirely for domestic purposes. The daily output of the mine was 1 ton. Sixty acres remained to be mined from this opening.

CORTEZ. MOWRY MINE.

Sample.—Bituminous (coking) coal; Durango field; analyses Nos. 12586 and 16479 (p. 34).

Mine.—Mowry, a drift mine, 1½ miles southeast of Cortez, no railroad connection.

Coal bed.—Unnamed bed. Cretaceous age, Dakota formation. The bed varies greatly in thickness and completely pinches out a quarter of a mile from the mine. The bed averages about 2 feet thick and exceeds that thickness only locally. Dip, 3° northwest. There is a layer of bony coal in the lower part which varies from 2 to 6 inches. No faults, rolls, or horsebacks have been encountered. The roof is a smooth sandstone; at places the sandstone is replaced by shale. The floor is shale and a smooth sandy clay. Particles from the roof and floor did not mix with the coal in mining. Cover at point of sampling, about 70 feet.

The bed was measured and sampled at one point in the mine by M. A. Pishel on August 28, 1911, and at one point by J. C. Roberts on February 14, 1913, as described below:

Sections of coal bed in Mowry mine.

Section.....	A	B
Laboratory No.....	12586	16479
Roof, sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 2	1 9
Bone.....	a 0 6	a 0 5
Floor, clay and shale.....		
Thickness of bed.....	2 8	2 2
Thickness of coal sampled.....	2 2	1 9

a Not included in sample.

Section A (sample 12586) was taken near the face, 75 feet from the mine mouth. Fine streaks of bony coal were interlaminated with the coal at this point.

Section B (sample 16479) was taken in the main entry 100 feet from the mine mouth.

Notes.—At the time of sampling the coal was blasted off the solid with black blasting powder. The coal was marketed for domestic purposes and was forked and dumped directly into the wagons for delivery. The yearly output was about 150 tons.

CORTEZ. TODD MINE.

Sample.—Bituminous coal; Durango field; analyses Nos. 16476, 16477, and 16478 (p. 34).

Mine.—Todd, a drift mine, in sec. 25, T. 35 N., R. 16 W., in the Mesa Verde National Park, about 7 miles from Cortez and 19 miles from the Rio Grande Southern Railroad.

Coal bed.—Lowest bed of the Mesaverde formation, Cretaceous age. Thickness, 2 feet 6 inches to 3 feet 6 inches. The bed has a thin persistent parting of shale one-

fourth inch to three-fourths inch thick near the middle. Roof, shale of poor quality; above the shale is a sandstone cap rock. Floor, hard smooth underclay. Particles of the roof and floor did not mix with the coal in loading. Cover at points of sampling, 80 to 100 feet.

The bed was measured and sampled at two points in the mine by J. C. Roberts on February 12, 1913, as described below:

Sections of coal bed in the Todd mine.

Section.....	A		B	
	16476		16477	
Laboratory No.....	<i>Ft.</i>	<i>In.</i>	<i>Ft.</i>	<i>In.</i>
Roof, "draw slate",	1	$\frac{3}{4}$	1	$3\frac{1}{2}$
Coal.....	0	$\frac{1}{4}$	0	$\frac{1}{2}$
Shale.....	1	9	1	8
Coal.....				
Floor, clay,				
Thickness of bed.....	2	10	3	0
Thickness of coal sampled.....	2	10	3	0

Section A (sample 16476) was measured at the face of room 9.

Section B (sample 16477) was measured at the face of room 10.

A composite sample was made by combining face samples 16476 and 16477. The results of an ultimate analysis of this sample are given under laboratory No. 16478.

Notes.—The mine is worked by the room-and-pillar system. At the time of sampling the coal was undercut and mined by hand, no explosives being used. The undercuttings were thrown into the gob. The coal was screened over bars 12 feet long with one-half-inch openings and picked as it was being loaded. The daily output was 4 tons, which was hauled from the mine in wagons. There were about 80 acres to be mined from this opening.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 75, 467.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 316, p. 389.

DOLORES. PROSPECT.

Sample.—Bituminous coal; Ute Mountain-Mancos field; analysis No. 12551 (p. 35).

Mine.—Unnamed prospect in the NE. $\frac{1}{4}$ sec. 29, T. 36 N., R. 15 W., 11 miles south of Dolores.

Coal bed.—Unnamed bed. Cretaceous age, Dakota formation. Dip, 2° northeast. In many places this bed is about 2 feet thick and exceeds that thickness only locally. The coal is extremely irregular in character, and sections taken only a few feet apart may not be alike. The roof is sandstone, which in places is replaced by shale; the shale is only a few inches, scarcely ever over 1 foot thick. Sandstone lenses interbedded in the coal are not uncommon.

The bed was measured and sampled by M. A. Pishel on August 18, 1911, as shown below:

Section of coal bed in prospect entry, 11 miles south of Dolores.

Laboratory No.....	12551	
	<i>Ft.</i>	<i>In.</i>
Roof, sandy shale.....	0	$3\frac{1}{2}$
Coal.....	a 0	$4\frac{1}{2}$
Shale.....	0	4
Coal.....	a 0	2
Bone.....	0	10
Coal, slightly bony.....	a 0	4
Bone.....	a 0	8
Coal, bony.....	a 0	1
Bone.....	0	9
Coal.....	a 0	2
Bone.....	0	4
Coal.....		
Bone (1½ feet).		
Floor, not stated.		
Thickness of bed.....	4	4
Thickness of coal sampled.....	2	$6\frac{1}{2}$

a Not included in sample.

Note.—The prospect apparently had not been worked for some time before the sample was taken, so that the sample is probably somewhat weathered. It was taken near the face of the entry, 20 feet from the mouth.

MANCOS. HALLER MINE.

Sample.—Bituminous coal; Durango field; analysis No. 12504 (p. 35).

Mine.—Haller; a drift mine in NE. $\frac{1}{4}$ sec. 30, T. 37 N., R. 13 W., 6 miles north of Mancos.

Coal bed.—Unnamed bed. Cretaceous age, Dakota formation. Dip, 2°. In many places this bed is about 2 feet thick and exceeds that thickness only locally. The coal is extremely irregular in character, being interlaminated with bone, shale, and sandstone lenses, and sections taken only a few feet apart may not be alike. In many places the roof is sandstone, at others it is shale; the latter is only a few inches, scarcely ever over 1 foot thick.

The bed was measured and sampled at one point in the mine on July 31, 1911, by M. A. Pishel, as shown below:

Section of coal bed in Haller mine.

Laboratory No.....	12504
Roof, shale.....	<i>Ft. in.</i>
Coal.....	0 7
Bone.....	a 0 6
Coal.....	0 3
Bone.....	a 1 2
Coal.....	0 5
Bone.....	a 0 5
Coal.....	0 6
Floor, shale.....	
Thickness of bed.....	3 10
Thickness of coal sampled.....	1 9

a Not included in sample.

The sample was taken in the entry, about 50 feet from the mine mouth.

Note.—The mine had not been worked for at least six months previous to the time this sample was taken, so the sample is probably somewhat weathered.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 75,467.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 316, p. 387.

MANCOS. PROSPECT.

Sample.—Bituminous coal; Ute Mountain-Mancos field; analysis No. 12444 (p. 35).

Location.—An unnamed prospect in NE. $\frac{1}{4}$ sec. 21, T. 36 N., R. 12 W., 8 miles northeast of Mancos.

Coal bed.—Unnamed bed. Cretaceous age, Dakota formation. Dip 6 $\frac{1}{2}$ ° south. In many places this bed is about 2 feet thick, and exceeds that thickness only locally. The coal is extremely irregular in character, being irregularly interlaminated with bone, shale, and sandstone lenses, and sections taken only a few feet apart may not be alike. In many places sandstone forms the roof, at others it is shale; the latter is a few inches to 1 foot thick.

The bed was measured and sampled July 16, 1911, by M. A. Pishel, as shown below:

Section of coal bed in prospect entry 8 miles northeast of Mancos.

Laboratory No.....	12444
Roof, sandstone, good.....	<i>Ft. in.</i>
Shale.....	a 0 2
Coal.....	0 6
Coal, bony.....	0 3
Bone.....	a 0 2
Coal.....	0 2
Shale.....	a 0 2 $\frac{1}{2}$
Coal, slightly bony.....	0 3
Floor, shale.....	
Thickness of bed.....	1 8 $\frac{1}{2}$
Thickness of coal sampled.....	1 2

a Not included in sample.

Note.—This sample was taken 20 feet from mouth of entry. The coal was somewhat weathered, as apparently coal had not been taken out of the prospect for at least one year. This bed is not known to be thicker at any place within 3 or 4 miles of this prospect.

OURAY COUNTY.

RIDGWAY. LOU CREEK MINE.

Sample.—Bituminous coal; Tongue Mesa field; analysis No. 12651 (p. 35).

Mine.—Lou Creek, a drift mine in NE. $\frac{1}{2}$ NE. $\frac{1}{4}$ sec. 22, T. 46 N., R. 7 W., 10 miles northeast of Ridgway.

Coal bed.—Lou Creek. Cretaceous age, Mesaverde formation. The character of the bed outside the mine is not known, and neither top nor bottom was exposed. The entry was run in on the coal, which appeared to be at least 20 feet thick, but this thickness may be due in part to crushing.

The bed was measured and sampled by W. T. Lee on September 12, 1911.

The sample was collected from the lower 6 feet of the bed as exposed in the mine, 600 feet from the mouth of the mine. Very little coal was mined; it was used for local purposes.

RIO BLANCO COUNTY.

MEEKER. BLACK DIAMOND MINE.

Sample.—Bituminous coal; Danforth Hills field; analysis No. 12776 (p. 35).

Mine.—Black Diamond; in sec. 15, T. 1 N., R. 94 W.; $1\frac{1}{2}$ miles northwest of Meeker, 47 miles north of the Denver & Rio Grande Railroad.

Coal bed.—Lord. Cretaceous age, Mesaverde formation. Thickness at least 14 feet.

The bed was measured and sampled at one point in the mine on October 18, 1911, by E. T. Hancock, as shown below:

Section of coal bed in Black Diamond mine.

Laboratory No.	12776
Sandstone.	<i>Ft. in.</i>
Coal.	3 10
Coal, streaked with shale.	0 4
Coal.	2 3
Thickness of bench mined.	6 5
Thickness of coal sampled.	6 5

There was coal below this section. The sample was taken in the mine 174 feet northeast of the entrance.

For analyses and descriptions of other samples of coal from this mine, see Bull. 22, Bureau of Mines, 1913, pp. 77, 471–472.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 415, 1910, p. 153.

MEEKER. CORNRIKE MINE.

Sample.—Bituminous coal; Danforth Hills field; analysis No. 12695 (p. 35).

Mine.—Cornrike mine; SW. $\frac{1}{4}$ sec. 10, T. 2 N., R. 93 W.; 10 miles northeast of Meeker; 54 miles north of Rifle, which is on the Denver & Rio Grande Railroad.

Coal bed.—No name. Cretaceous age, Mesaverde formation. Dip 20° S., 27° E. Total thickness measured outside of mine, 21 feet 7 inches.

The bed was measured and sampled at one point in the mine by E. T. Hancock, on October 5, 1911.

The sample was taken in the mine, 30 feet northeast of the mine mouth, in a 7-foot 6-inch bench of clean coal. There was coal above and below the bench.

Notes.—For a description of the coal beds in this township, see U. S. Geol. Survey Bull. 415, 1910, pp. 160-162.

MEEKER. FAIRFIELD MINE.

Sample.—Bituminous coal; Danforth Hills field; analysis No. 12518 (p. 35).

Mine.—Fairfield; SW. $\frac{1}{4}$ sec. 28, T. 1 N., R. 94 W.; $2\frac{1}{2}$ miles west of Meeker and 45 miles north of the Denver & Rio Grande Railroad.

Coal bed.—No name. Cretaceous age, Mesaverde formation. Dip, 42° N., 67° W.

The bed was measured and sampled at one point in the mine by E. T. Hancock on August 12, 1911, as shown below:

Section of coal bed in Fairfield mine.

Laboratory No.....	12518
Roof, coal (not mined).....	<i>Ft. in.</i>
Coal.....	6 0
Bone.....	a 0 4
Coal.....	0 4
Floor, carbonaceous shale.....	
Thickness of coal mined.....	6 8
Thickness of coal sampled.....	6 4

a Excluded from sample.

The sample was taken in the mine, 300 feet northeast of the mine mouth.

For a description of the geologic relations of this coal bed, see U. S. Geol. Survey Bull. 316, 1910, p. 143.

MEEKER. MEEKER MINE.

Sample.—Bituminous coal; Danforth Hills field; analysis No. 12426 (p. 35).

Mine.—Meeker NW. $\frac{1}{4}$ sec. 22, T. 1 N., R. 94 W., three-fourths mile northwest of Meeker and 46 miles north of the Denver & Rio Grande Railroad.

Coal bed.—Old Pollard. Cretaceous age, Mesaverde formation. Dip, 20° NW.

The bed was measured and sampled at one point in the mine by E. T. Hancock on July 15, 1911.

The sample was taken in the mine about 500 feet northeast of the mine mouth and represents 6 feet 6 inches of coal. There was sandstone above the coal and brown shale below it.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 316, 1910, p. 151.

MEEKER. MONTGOMERY MINE.

Sample.—Bituminous coal; Danforth Hills field; analysis No. 12777 (p. 35).

Mine.—Montgomery; SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 29, T. 1 N., R. 94 W.; 3 miles west of Meeker, on the main stage road, and about 42 miles north of the Denver & Rio Grande Railroad.

Coal bed.—No name. Cretaceous age, Mesaverde formation. Thickness, 7 feet 6 inches. Dip, 60° NW.

The bed was measured and sampled by E. T. Hancock on October 18, 1911.

The sample was taken in the mine 474 feet northeast of the mine mouth, in 7 feet 6 inches of coal. There was sandstone above the coal and a brown shale below it.

For a description of the coal beds of Meeker Township see U. S. Geol. Survey Bull. 316, 1910, pp. 141-160.

MEEKER. SULPHUR CREEK MINE.

Sample.—Bituminous coal; Danforth Hills field; analysis No. 12773 (p. 35).

Mine.—Sulphur Creek, in SE. $\frac{1}{4}$ sec. 3, T. 1 N., R. 94 W., on Sulphur Creek, $2\frac{1}{2}$ miles north of Meeker and 49 miles north of the Denver & Rio Grande Railroad. No railroad connections.

Coal bed.—No name. Cretaceous age; Mesaverde formation.

The bed was measured and sampled at one point in the mine by E. T. Hancock on October 17, 1911, as shown below:

Section of coal bed in Sulphur Creek mine.

Laboratory No.	12773
Roof, coal (not mined).....	<i>Ft. in.</i>
Coal.....	1 8
Sandstone, shaly.....	0 ½
Coal.....	0 1
Sandstone, shaly.....	1 ½
Coal.....	a 0 6
Shale, carbonaceous.....	1 6
Coal.....	a 0 ¾
Floor, shale.....	2 ½
Thickness of bench mined.....	5 9
Thickness of coal sampled.....	5 7½

a Not included in sample.

The sample was taken in the mine, 245 feet north of the mine mouth.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 77, 78, 473.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 415, 1910, p. 155.

MEEKER. WESSON MINE.

Sample.—Bituminous coal; Danforth Hills field; analysis No. 12705 (p. 35).

Mine.—Wesson, on the west side of Coal Creek, in sec. 30, T. 2 N., R. 92 W., 12 miles northeast of Meeker and 55 miles north of the Denver & Rio Grande Railroad.

Coal bed.—No name. Cretaceous age, Mesaverde formation. Thickness, about 22 feet 3½ inches. Dip, 60° SW.

The bed was measured and sampled at one point in the mine by E. T. Hancock on October 6, 1911, as shown below:

Section of coal bed in the Wesson mine.

Laboratory No.	12705
Coal (not mined).....	<i>Ft. in.</i>
Coal.....	2 1
Coal, shaly.....	0 1
Coal.....	11 0
Shale, carbonaceous.....	a 0 1
Coal.....	2 4
Sandstone.....	a 0 ½
Coal.....	2 8
Coal (not mined).....	
Thickness of coal mined.....	18 3½
Thickness of coal sampled.....	18 2

a Not included in sample.

Sample 12705 was taken in the mine, 258 feet northwest of the mine mouth.

For a description of the geologic relations of this coal bed, see U. S. Geol. Survey Bull. 415, 1910, p. 164.

IDAHO.

BOISE COUNTY.

HORSESHOE BEND. HENRY MINE.

Sample.—Subbituminous coal; Horseshoe Bend field; analyses Nos. 12391 and 12703 (p. 35).

Mine.—Henry, a slope mine in NW. ¼ sec. 3, T. 6 N., R. 2 E., at Horseshoe Bend, about 20 miles north of Boise.

Coal bed.—No name. Tertiary age, Payette formation. Thickness irregular, average 18 to 20 inches; dip about 50° west. Roof, black shale; floor, clay.

The bed was sampled and measured at one point in the mine by C. T. Kirk and C. F. Bowen, on June 22 and at one point by C. F. Bowen on October 8, 1911, as shown below:

Section of coal bed in Henry mine.

Laboratory No.....	12703
Roof, shale.....	<i>Ft. in.</i>
Coal.....	1 6
Clay.....	0 4
Bone.....	0 2
Coal.....	0 4
Bone.....	0 3
Clay.....	0 2
Floor, sandstone.....	
Thickness of bed.....	2 9
Thickness of coal sampled.....	1 6

^a Not included in sample.

Notes.—Sample 12703 was taken in the Jensen level, 140 feet from the mouth of the slope and about 175 feet below the surface. It represents freshly mined coal.

Sample 12391 was taken about 60 feet from the mouth of the slope and represents 2 feet of coal. As the face had been exposed to the atmosphere for about a year the coal was perhaps more or less weathered.

For a description of the geologic relations of this coal bed, see U. S. Geol. Survey Bull. 531, 1911, p. 249.

CASSIA COUNTY.

OAKLEY. WORTHINGTON MINE.

Sample.—Lignite; Goose Creek district; analysis No. 12643 (p. 36).

Mine.—Worthington; a slope mine SE. $\frac{1}{4}$ sec. 26 (unsurveyed), T. 16 S., R. 20 E., on Goose Creek, about 22 miles southwest of Oakley.

Lignite bed.—Worthington. Tertiary age, Payette (?) formation. Dip, about 10° east. The bed was measured and sampled at one point in the mine, by C. F. Bowen on September 19, 1911, as shown below:

Section of lignite bed in Worthington mine.

Laboratory No.....	12643
Roof, clay.....	<i>Ft. in.</i>
Lignite.....	1 8
Clay.....	0 1 $\frac{1}{2}$
Lignite.....	2 4
Thickness of bed.....	4 1 $\frac{1}{2}$
Thickness of coal sampled.....	4 0

^a Not included in sample.

The sample was taken in the slope about 200 feet from its mouth.

Notes.—This is the most important bed in the Goose Creek district. At the time of sampling in 1911 the mine had been idle for more than a year. For a description of the geologic relations of this coal bed, see U. S. Geol. Survey Bull. 531 1913, p. 258.

FREMONT COUNTY.

HADEN. BROWN BEAR MINE.

Sample.—Bituminous coal; Teton Basin field; analysis No. 15115 (p. 36).

Mine.—Brown Bear; in sec. 25, T. 5 N., R. 43 E.; Horseshoe Creek district, about 10 miles southwest of Haden.

Coal bed.—Not named. Cretaceous age; formation not yet determined.

The bed was measured and sampled at one point in the mine by E. G. Woodruff on September 28, 1912, as shown below:

Section of coal bed in Brown Bear mine.

Laboratory No.....	15115
Roof, shale.....	<i>Ft. in.</i>
Coal.....	3 11
Shale.....	a 0 3
Coal.....	1 1
Shale.....	
Thickness of bed.....	5 3
Thickness of coal sampled.....	5 0

a Not included in sample.

Sample 15115 was taken at the end of the north entry, 950 feet from the portal, where mining had been done recently and where the coal was unweathered.

For a description of the geologic relations of this coal bed, see U. S. Geol. Survey Bull. 541, 1914.

HADEN. HORSESHOE MINE.

Sample.—Bituminous coal; Teton Basin field; analysis No. 15116 (p. 36).

Mine.—Horseshoe; in sec. 6, T. 4 N., R. 44 E.; Horseshoe Creek district, about 10 miles southwest of Haden.

Coal bed.—Not named. Cretaceous age; formation not yet determined.

The bed was measured and sampled at one point in the mine by E. G. Woodruff on September 28, 1912, as shown below:

Section of coal bed in Horseshoe mine.

Laboratory No.....	15116
Roof, shale.....	<i>Ft. in.</i>
Coal.....	1 11
Sandstone.....	a 0 10
Coal.....	3 4
Coal, very impure.....	a 1 9
Coal.....	3 3
Floor, shale.....	
Thickness of bed.....	11 1
Thickness of coal sampled.....	8 6

a Not included in sample.

Notes.—This sample was taken in an abandoned mine about 200 feet from the portal at a point where the bed is under 60 feet of cover. The mine was dry. The face had been exposed for more than a year and was cleaned before sampling. The coal was probably slightly weathered.

For a description of the geologic relations of this coal bed, see U. S. Geol. Survey Bull. 541, 1914.

ILLINOIS.

MADISON COUNTY.

COLLINSVILLE. CANTINE No. 3 MINE.

Sample.—Bituminous coal; Illinois field; analyses Nos. 10956, 10957, 10958, and 10959 (p. 36).

Mine.—Cantine No. 3, a shaft mine in the Central Illinois district, 1 mile east of Collinsville, on the Vandalia Railroad.

Coal bed.—Herrin coal (Belleville, No. 6) of the United States Geological Survey. Carboniferous age, Carbondale formation. Average thickness, 7 feet 3 inches. The roof is a gray shale, above the shale is a limestone cap rock. The floor is a smooth, hard fire clay.

The bed was measured and sampled at three points in the mine by P. M. Riefkin on September 23, 1910, as described below:

Sections of coal bed in Cantine No. 3 mine.

Section.....	A	B	C
Laboratory No.....	10956	10957	10958
Roof, gray shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 4	1 1½	1 6½
"Sulphur".....	0	0	0 ½
Coal.....	1 4½	1 2	0 8
"Sulphur".....	a 0	a 0 1	0 ½
Coal.....	0 5½	0 5½	0 5
"Sulphur".....	a 0	a 0 ½	a 0 ½
Coal.....	0 8½	0 8	1 0
Mother coal.....	0	a 0 1	0 ½
Coal.....	1 3½	1 2½	1 6½
"Sulphur".....	a 0 1½	a 0 1	a 0 ½
Coal.....	0 9½	0 5½	0 5½
Hard blue band.....	a 0 1	a 0 1½	a 0 1
Bottom coal.....	1 5	1 5½	1 10
Floor, fire clay.....			
Thickness of bed.....	7 8½	6 10½	7 7½
Thickness of coal sampled.....	7 5½	6 6½	7 5½

a Not included in sample.

Section A (sample 10956) was measured on the rib, 10 feet from the face of west entry 10 off the north heading, 3,200 feet northwest of the shaft.

Section B (sample 10957) was measured at the face of the first stub on east entry 8 off the north heading, 4,200 feet north of the shaft.

Section C (sample 10958) was measured on the rib 8 feet from the face of east entry 7, off the south heading, 2,500 feet southeast of the shaft.

A composite sample was made by combining face samples 10956, 10957, and 10958. The results of an ultimate analysis of this sample are shown under laboratory No. 10959.

Notes.—The mine is opened by a shaft 165 feet deep. At the time of sampling the coal was undercut with punching machines and broken down with black powder. The tippie was equipped with shaker screens to prepare the coal for various commercial and domestic sizes. There were four loading tracks with a capacity of 40 loaded and 20 empty cars.

MONTGOMERY COUNTY.

PANAMA. PANAMA No. 1 MINE.

Sample.—Bituminous coal; Illinois field; analyses Nos. 11352, 11353, and 11354 (p. 37).

Mine.—Panama No. 1, a shaft mine in Gresham Township, one-fourth of a mile north of Panama, on the Toledo, St. Louis & Western Railroad.

Coal bed.—Herrin coal (Belleville, No. 6) of the United States Geological Survey. Carboniferous age, Carbondale formation. Thickness, 6 feet 6 inches to 7 feet 6 inches. Roof, limestone; floor, clay. The bed was measured and sampled at two points in the mine by R. Y. Williams, on November 23, 1910, as shown below:

Sections of coal bed in Panama No. 1 mine.

Section.....	A	B
Laboratory No.....	11352	11353
Roof, limestone.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 11	1 7
"Sulphur".....	{ a Knife edge. }	a 0 ½
Coal.....	0 4½	0 9½
"Sulphur".....	a 0	a 0
Coal.....	0 6	0 5½

a Not included in sample.

Sections of coal bed in Panama No. 1 mine—Continued.

Roof, limestone—Continued.	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
"Sulphur".....	a 0	$\frac{1}{2}$	a 0	$\frac{3}{4}$
Coal.....	0	2 $\frac{1}{2}$		
Mineral charcoal.....	0	$\frac{3}{4}$		
Coal.....	1	0	1	4
"Sulphur".....	a 0	$\frac{1}{4}$	{ a Knife edge.	
Coal.....	0	1		$\frac{7}{8}$
"Sulphur" (blue band).....	a 0	$\frac{1}{2}$	a 0	$\frac{1}{2}$
Coal.....	0	10 $\frac{1}{2}$	0	11 $\frac{3}{4}$
"Sulphur".....	a 0	$\frac{1}{2}$	a 0	
Coal.....	0	11 $\frac{1}{2}$	0	2
"Sulphur".....	a 0	1 $\frac{1}{2}$	a 0	$\frac{1}{2}$
Coal.....	0	2 $\frac{1}{2}$	0	1
"Sulphur".....	a 0	$\frac{3}{4}$	a 0	1
Coal.....	1	2 $\frac{1}{2}$	0	4
Floor, clay.				
Thickness of bed.....	7	6	6	7 $\frac{1}{2}$
Thickness of coal sampled.....	7	3	6	3 $\frac{1}{2}$

a Not included in sample.

Section A (sample 11352) was measured at the face of room 1, third south stub off the third southeast entry, about 2,000 feet from the shaft.

Section B (sample 11353) was measured at the face of room 4, third north stub off west entry 6, off north entry, 2,000 feet from the shaft.

A composite sample was made by combining face samples 11352 and 11353. The results of an ultimate analysis of this sample are given under laboratory No. 11354.

Notes.—The mine is opened by a shaft about 375 feet deep. The coal is mined by both the room-and-pillar and the panel systems. Entry pillars are left to protect the entries. At the time of sampling the mine was equipped to produce 2,500 tons of coal per 8-hour day.

SALINE COUNTY.**HARRISBURG. O'GARA No. 9 MINE.**

Sample.—Bituminous coal; Illinois field; analysis Nos. 12794 and 12795 (p. 37).

Mine.—O'Gara No. 9, a shaft mine in the Saline County district, 1 mile south of Harrisburg, on the Big Four Railroad.

Coal bed.—No. 5 of the Illinois Geological Survey. Carboniferous age, Carbondale formation. Average thickness, 6 feet; dip 3 per cent northeast. Cleat, northeast and southwest. Occasional dikes are encountered. Roof, a blue shale; 2 to 14 inches of this shale comes down with the coal in mining; floor, a hard clay. Cover at points of sampling, 150 to 240 feet.

The bed was measured and sampled at two points in the mine by H. I. Smith on August 27, 1911, as described below:

Sections of coal bed in O'Gara No. 9 mine.

Section.....	A		B	
Laboratory No.....	12794		12795	
Roof, blue shale.....	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Coal, bright.....	0	7 $\frac{1}{2}$	0	6
Mother coal or "sulphur".....	a 0	1 $\frac{1}{2}$	..	..
Coal, bright.....	0	6	..	..
"Sulphur".....	a 0	$\frac{1}{2}$	a 0	$\frac{1}{2}$
Coal, laminated with dirt bands.....	1	3	..	..
Bone or "sulphur".....	0	$\frac{1}{2}$	..	..
Coal, bright.....	4	10 $\frac{1}{2}$	6	1
Floor, hard clay.....				
Thickness of bed.....	7	5	6	7 $\frac{1}{2}$
Thickness of coal sampled.....	7	3	6	7

a Not included in sample.

Section A (sample 12794) was measured at the face of west entry 3, off the main south entry, between rooms 18 and 19, about 3,000 feet from the shaft.

Section B (sample 12795) was measured at the face of the second crosscut in room 11, off west entry 3, off the main south entry.

Notes.—The mine is opened by a shaft 152 feet deep. The coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut by electric chain cutting machines and shot down with C, F, FF, and FFF black blasting powder. No explosives were used for brushing the roof or floor. None of the coal was shipped as run-of-mine. The screening equipment consisted of a double-decked bar screen 21 feet long by 7 feet wide, the upper screen having openings 2 inches by 2½ inches and the lower screen openings 1½ inches square. Pickers were employed on the car in loading. There were three loading tracks with a capacity of 40 empty and 60 loaded cars. The daily output averaged 2,500 tons; the capacity was 3,100 tons.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 90, 507.

For results of tests of coal from this mine see mention of specific tests as follows—Steaming tests: U. S. Geol. Survey Bull. 332, p. 119; Bureau of Mines Bull. 23, pp. 61, 159; briquetting tests, U. S. Geol. Survey Bull. 332, p. 119.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 316, 1907, p. 130.

VERMILION COUNTY.

WESTVILLE. LITTLE VERMILION MINE.

Sample.—Bituminous coal; Illinois field; analysis No. 14682 (p. 37).

Mine.—Little Vermilion, a mine in the Grape Creek district, sec. 19, T. 18 N., R. 11 W., 2 miles south of Westville.

Coal bed.—No. 6 of the Illinois Geological Survey. Carboniferous age, Carbondale formation.

Sample 14682 represents a car of run-of-mine coal used in combustion test (test No. 336) at the Bureau of Mines testing plant at Pittsburgh, Pa. The sample was taken by E. R. Linkenhoker while the car was being unloaded.

INDIANA.

SULLIVAN COUNTY.

DUGGER. VANDALIA No. 10 MINE.

Sample.—Bituminous coal; bituminous coal field; analyses Nos. 10960 and 10961 (p. 37).

Mine.—Vandalia No. 10, 1½ miles southwest of Dugger, on the Vandalia Railroad.

Coal bed.—No. 4 of the Indiana Geological Survey. Carboniferous age, Allegheny formation. Average thickness, about 5 feet 6 inches. Roof, a gray shale 20 feet thick; above the shale is a sandstone cap rock. Floor, clay 6 to 10 feet thick; below the clay is a sandstone. The bed was measured and sampled at two points in the mine by R. Y. Williams on September 21, 1910, as described below:

Sections of coal bed in Vandalia No. 10 mine.

Section.....	A	B
Laboratory No.....	10960	10961
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Rash.....		a 0 ½
Coal, hard and bright.....	1 5	2 8
Bone and shale.....		a 0 2
Natural charcoal.....	a 0 ..	.. ..
Coal, hard and bright.....	0 5½	0 3
"Sulphur" and bone.....		a 0 ½
Natural charcoal.....	0 ..	.. ..
Coal, hard and bright.....	1 ..	1 11½
Bottom coal.....		0 2
Shale parting.....	a 0 2	.. ..
Coal, hard and bright.....	2 3	.. ..
Floor, clay.....		
Thickness of bed.....	5 5½	5 3½
Thickness of coal sampled.....	5 2½	5 ½

a Not included in sample.

Section A (sample 10960) was measured at the face of room 2, off east entry 6 off north entry 2, off the main east entry.

Section B (sample 10961) was measured at the face of room 12, off east entry 6 off north entry 2, off the main east entry.

Note.—At the time of sampling the output was 1,600 tons a day.

WARRICK COUNTY.

ELBERFELD. ELBERFELD MINE.

Sample.—Bituminous coal; bituminous coal field; analysis No. 16578 (p. 37).

Mine.—Elberfeld, a shaft mine 1 mile south of Elberfeld station on the E. & I. siding.

Coal bed.—No. 5 of the Indiana Geological Survey. Carboniferous age, Allegheny formation. Average thickness, 4 feet 6 inches; dip southwest, in places as much as 5°. The coal has a cleat, but no faults or horsebacks. There are no persistent partings, but kidney "sulphur" and "sulphur" flakes occur at intervals. The roof is a hard black shale which does not come down in mining, overlain by a softer shale. The floor is a hard fire clay which mixed slightly with the coal in loading. Cover at point of sampling, 185 feet.

The bed was measured and sampled at one point in the mine by J. J. Rutledge and H. D. Mason, jr., on February 6, 1913, as described below:

Section of coal bed in Elberfeld mine.

Section.....	A
Laboratory No.....	16578
Roof, hard black shale.....	<i>Ft. in.</i>
Coal.....	1 0
"Steel" band.....	0 $\frac{1}{2}$
Coal.....	0 8
"Steel" band.....	0 $\frac{1}{2}$
Coal.....	2 4
Floor, hard fire clay.....	
Thickness of bed.....	4 $\frac{1}{2}$
Thickness of coal sampled.....	4 $\frac{1}{2}$

Section A (sample 16578) was measured in the new manway off the main west entry, 200 feet north of the shaft bottom.

Notes.—The mine is opened by a shaft 185 feet deep, and the coal is mined by the room-and-pillar, double-entry system. At the time of sampling the coal was undercut by hand and shot down with C and F black blasting powder. Seventy-five per cent of the coal was shipped as run-of-mine. The coal was hoisted on a self-dumping cage to a wooden tippie. The tippie had shaking screens 40 feet long by 5 feet wide with 2½-inch holes. Pickers were employed on the cars while loading. There were three loading tracks, with a capacity of 25 empty and 25 loaded cars. The average daily output was 250 tons, the capacity 300 tons. About 50 acres remained to be mined from the present opening.

KANSAS.

CRAWFORD COUNTY.

FRANKLIN. WESTERN NO. 16 MINE.

Sample.—Bituminous coal; Kansas field; analysis No. 17032 (p. 37).

Mine.—Western No. 16; one-fourth of a mile west of Franklin, on the Missouri Pacific Railway and the Atchison, Topeka & Santa Fe Railway.

Coal bed.—Weir-Pittsburg. Carboniferous age, Cherokee shale. Average thickness, 2 feet 10 inches; dip, northwest. The coal is very clean except for thin streaks of

pyrite near the middle of the coal bed. Rolls, clay veins, horsebacks, and slips are numerous and a source of much added expense in mining. Roof, bluish shale; floor, underclay, which at times heaves. Cover at point of sampling, about 220 feet.

The bed was measured and sampled at one point in the mine by C. S. Stevenson on April 16, 1913.

Sample 17032 was taken at a point in the mine 2,000 feet southwest of the shaft, and represents 2 feet 11 inches of clean coal. There was shale above the coal and clay below it.

Notes.—The mine is opened by a shaft 219 feet deep. The coal is mined by the double-entry, room-and-pillar system. At the time of sampling the coal was shot off the solid and gave trouble in sticking to the roof. In the haulageways the top was brushed to a height of 2 feet, but in the air course the top was not brushed. The coal was principally marketed for railroad purposes. The output was about 700 tons a day.

FULLER. SHERIDAN NO. 2 MINE.

Sample.—Bituminous coal; Kansas field; analyses Nos. 11181, 11182, 11183, and 11184 (p. 38).

Mine.—Sheridan No. 2, a shaft mine in sec. 12, T. 29 N., R. 25 E., in the southwest corner of the town of Fuller, on the Kansas City Southern Railway.

Coal bed.—Wier-Pittsburg. Carboniferous age, Cherokee shale. Average thickness, 3 feet; bed horizontal. Roof, dark gray shale 10 to 12 feet thick; floor, hard shale.

The bed was measured and sampled at three points in the mine by R. D. Killian on November 12, 1910, as described below:

Sections of coal bed in Sheridan No. 2 mine.

Section.....	A	B	C
Laboratory No.....	11181	11182	11183
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 0	1 0	1 0
"Sulphur" band.....	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$
Coal.....	1 4	1 4	1 4
"Sulphur" band.....	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$
Coal.....	0 7	0 7	0 7
Floor, shale.....			
Thickness of bed.....	3 0	3 0	3 0
Thickness of coal sampled.....	2 11	2 11	2 11

a Excluded from sample.

Section A (sample 11181) was measured at the face, 2,500 feet southwest of the shaft.

Section B (sample 11182) was measured at the face, 2,500 feet northeast of the shaft.

Section C (sample 11183) was measured at the face, 2,500 feet northwest of the shaft.

A composite sample was made by combining face samples 11181, 11182, and 11183. The results of an ultimate analysis of this sample are shown under laboratory No. 11184.

Notes.—At the time of sampling the output was 375 to 400 tons a day.

YALE. WESTERN NO. 13 MINE.

Sample.—Bituminous coal; Kansas field; analyses Nos. 11209, 11210, 11211, and 11212 (p. 38).

Mine.—Western No. 13, a shaft mine in sec. 26, T. 30 N., R. 25 E., three-fourths of a mile northwest of Yale, on the Missouri Pacific Railroad.

Coal bed.—Wier-Pittsburg (?). Carboniferous age, Cherokee shale. Average thickness, 3 feet; practically horizontal. Roof, dark gray shale 30 feet thick; floor, soft shale. Cover at points of sampling, 87 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on November 14, 1910, as described below:

Sections of coal bed in Western No. 13 mine.

Section.....	A	B	C
Laboratory No.....	11209	11210	11211
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 8	1 8	1 8
"Sulphur" band.....	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$
Coal.....	1 3 $\frac{1}{2}$	1 3 $\frac{1}{2}$	1 3 $\frac{1}{2}$
Floor, shale.....			
Thickness of bed.....	3 0	3 0	3 0
Thickness of coal sampled.....	2 11 $\frac{1}{2}$	2 11 $\frac{1}{2}$	2 11 $\frac{1}{2}$

a Not included in sample.

Section A (sample 11209) was measured at the face, 2,600 feet north of the shaft.

Section B (sample 11210) was measured at the face, 2,800 feet southeast of the shaft.

Section C (sample 11211) was measured at the face, 2,800 feet southwest of the shaft.

A composite sample was made by combining face samples 11209, 11210, and 11211. The results of an ultimate analysis of this sample are shown under laboratory No. 11212.

Notes.—The mine is opened by a shaft about 90 feet deep. At the time of sampling the output was 500 tons a day.

LEAVENWORTH COUNTY.

LANSING. PENITENTIARY MINE.

Sample.—Bituminous coal; Kansas field; analyses Nos. 12841, 12842, 12843, and 12844 (pp. 38, 39).

Mine.—Penitentiary; sec. 19, T.9S., R. 23E.; Leavenworth district; on Missouri Pacific, Atchison, Topeka & Santa Fe, and Union Pacific railroads.

Coal bed.—Bevier. Carboniferous age, Pennsylvanian series, Cherokee shale. Roof, chiefly firm, dark drab shale; floor, thin underclay on limestone. Thickness, regular, average 22 inches. Cover at points of sampling, 720 feet.

The bed was measured and sampled at three points in the mine by M. Albertson on September 15, 1911.

Sample 12841 was taken 1,100 feet south and 1,400 feet east of the shaft in 22 inches of coal.

Sample 12842 was taken 4,400 feet east and 500 feet north of the shaft in 22 inches of coal.

Sample 12843 was taken 2,300 feet east and 2,600 feet north of the shaft in 22 inches of coal.

A composite sample was made by mixing face samples 12841, 12842, and 12843. The results of the ultimate analysis of this sample are shown under laboratory No. 12844.

LEAVENWORTH. No. 1 MINE.

Sample.—Bituminous coal; Kansas field; analyses Nos. 12849, 12850, 12851, and 12852 (p. 39).

Mine.—No. 1; Leavenworth district, at Leavenworth; sec. 36, T. 8 S., R. 22 E.; on the Missouri Pacific Railway.

Coal bed.—Bevier. Carboniferous age, Pennsylvanian series, Cherokee shale. Roof, chiefly firm, dark drab shale; floor, thin underclay on limestone. Thickness, regular, average 22 inches. Cover at points of sampling, 720 feet.

The bed was measured and sampled at two points in the mine by M. Albertson on September 16, 1911.

Sample 12849 was taken 3,200 feet north and 560 feet west of the shaft in 21 inches of coal.

Sample 12850 was taken 160 feet west and 3,100 feet south of the shaft in 21 inches of coal.

Sample 12851 was taken 110 feet east and 3,310 feet north of the shaft in 22 inches of coal.

A composite sample was made by mixing face samples 12849, 12850, and 12851. The results of an ultimate analysis of this sample are shown under laboratory No. 12852.

LEAVENWORTH. No. 3 MINE.

Sample.—Bituminous coal; Kansas field; analyses Nos. 12845, 12846, 12847, and 12848 (p. 39).

Mine.—No. 3; Leavenworth district, at Leavenworth; sec. 25, T. 8 S., R. 22 E.; on Missouri Pacific Railway.

Coal bed.—Bevier. Carboniferous age, Pennsylvanian series, Cherokee shale. Roof, chiefly firm, dark drab shale; floor, thin underclay on limestone. Thickness, regular, average 22 inches. Cover, 720 feet. The bed was measured and sampled at two points in the mine by M. Albertson on September 18, 1911.

Sample 12845 was taken 3,400 feet southeast of the shaft in 22 inches of coal.

Sample 12846 was taken 3,800 feet southeast of the shaft in 22 inches of coal.

Sample 12847 was taken 3,350 feet southeast of the shaft in 22 inches of coal.

A composite sample was made by mixing face samples 12845, 12846, and 12847. The results of an ultimate analysis of this sample are shown under laboratory No. 12848.

KENTUCKY.

LETCHER COUNTY.

FLAT GAP, VA. LOCAL MINE.

Sample.—Bituminous coal; eastern Kentucky field; analysis No. 15172 (p. 39).

Mine.—A local drift mine, 1½ miles south of Flat Gap, Va., 10 miles from the nearest railroad.

Coal bed.—Lower Standiford. Carboniferous age, Wise formation. Thickness uniform, nearly flat. Roof, shale; floor, clay. Cover at points of sampling, 25 feet.

The bed was measured and sampled at one point in the mine by Charles Butts on November 1, 1912.

Sample 15172 was taken in the entry about 15 feet from the mine mouth, in 3 feet 2 inches of coal, all of which was included in the sample. The roof at this point was shale and the floor was clay.

Notes.—Bright, firm coal, sold for domestic use.

FLAT GAP, VA. J. H. MULLIN MINE.

Sample.—Bituminous coal; eastern Kentucky field; analysis No. 15173 (p. 39).

Mine.—J. H. Mullin, a local mine 3½ miles southwest of Flat Gap, Va., and 10 miles from the nearest railroad.

Coal bed.—Lower Bolling. Carboniferous age, Wise formation. The bed was measured and sampled at one point in the mine by Charles Butts on November 1, 1912, as described below:

Section of coal bed in J. H. Mullin mine.

Laboratory No.	15173
Coal	<i>Ft. in.</i>
Clay	2 3
Coal	a 0 2
Clay	1 6
Coal	a 0 4
Coal	0 4
Thickness of bed	4 7
Thickness of coal sampled	4 1

a Not included in sample.

The above section was measured in the main entry, 40 feet from the mine mouth.

JENKINS. CONSOLIDATION No. 204 MINE.

Sample.—Bituminous coal; eastern Kentucky field; analyses Nos. 14904 and 14905 (p. 39).

Mine.—Consolidation No. 204, a drift mine at Jenkins, on the Baltimore & Ohio Railroad.

Coal bed.—Upper Elkhorn. Carboniferous age, Pottsville group. Thickness, uniform, flat. Roof, shale; floor, clay.

The bed was measured and sampled at two points in the mine by Charles Butts on October 12, 1912, as described below:

Sections of coal bed in Consolidation No. 204 mine.

Section.....	A	B
	14904	14905
Laboratory No.....		
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 7	4 0
Clay.....	a 0 3	a 0 5
Coal.....	3 8½	4 0
Floor, clay.....		
Thickness of bed.....	7 6½	8 5
Thickness of coal sampled.....	7 3½	8 0

a Not included in sample.

Section A (sample 14904) was measured at the face of the main heading, 1,700 feet from the mine mouth.

Section B (sample 14905) was measured at the face of the east heading, 1,700 feet from mine mouth.

Notes.—The clay parting near the middle of the bed is soft and friable and is utilized as a mining bench. Most of the bed is coal of medium hardness and brightness, but the lower 18 inches includes a considerable proportion of tough hard splint coal. A large part of the output was being shipped to Michigan, where it was utilized in by-product ovens.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 348, p. 37.

JENKINS. LOCAL MINE.

Sample.—Bituminous coal; eastern Kentucky field; analyses Nos. 14970 and 14971 (p. 40).

Mine.—A local drift mine, 5 miles northeast of Jenkins, near the Baltimore & Ohio Railroad.

Coal bed.—Lower Elkhorn; Carboniferous age, Pottsville group. Thickness uniform, flat. Roof, sandstone; floor, clay.

The bed was measured and sampled by Charles Butts, October 16, 1912, as described below:

Section of coal bed in mine 5 miles north of Jenkins.

Laboratory No.....	{	14970
Roof, sandstone.....		14971
Coal.....		<i>Ft. in.</i>
Coal, laminated.....		a 0 8
Coal.....		b 1 0
Floor, clay.....		a 1 4½
Thickness of bed.....		3 ½

a Included in sample 14970.

b Included in sample 14971.

The section was measured at the face of the entry, 50 feet from the mouth of the mine.

Notes.—The laminated bench of soft coal is 1 foot thick and is high in impurities. The output is used for local, domestic, and steam purposes.

MUHLENBERG COUNTY.

CENTRAL CITY. CENTRAL MINE.

Sample.—Bituminous coal; western Kentucky field; analyses Nos. 13257, 13258, 13259, and 13260 (p. 40).

Mine.—Central, a shaft mine one-eighth of a mile south of the depot at Central City, on the Owensburg-Russellville branch of the Louisville & Nashville Railroad and on the Louisville branch of the Illinois Central Railroad.

Coal bed.—No. 9 of the Kentucky Geological Survey. Carboniferous age, Pottsville group. Thickness, 4 feet 9 inches to 6 feet. The bed dips north about 15 feet per mile. The coal contains thin streaks of "sulphur" and some "sulphur" balls. The roof is a black shale 2 to 4 feet thick and is of good quality. The floor is a clay which weathers when exposed to air. Upon exposure for a year it weathers to an average depth of 6 inches and this feature is utilized by driving the narrow work about one year in advance of turning the rooms. Cover at points of sampling, about 170 feet.

The bed was measured and sampled at three points in the mine by C. S. Stevenson on January 22 and 23, 1912.

Sample 13257 was taken at the face of the main south entry, and represents 5 feet 6 inches of clear coal.

Sample 13258 was taken in room 20, off the main south blind entry, and represents 5 feet 6 inches of clear coal.

Sample 13259 was taken in room 3, off sixth south entry, off the main west entry, and represents 5 feet 6 inches of clear coal.

A composite sample was made by mixing face samples 13257, 13258, and 13259. The results of an ultimate analysis of this sample are given under laboratory No. 13260.

Notes.—The mine is opened by a shaft 170 feet deep and is worked on the room-and-pillar system. At the time of sampling, all the coal was undercut with picks to one-half the depth of the drill hole and broken down with F and FF black blasting powder. Most of the output was used for domestic purposes, a small amount being sold for transportation purposes.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 106, 542.

For results of tests of coal from this mine see mention of specific tests as follows—Steaming tests: Bull. 13, Bureau of Mines, pp. 137, 274; coking tests: U. S. Geol. Survey Bull. 336, 1908, pp. 23, 30, 39; cupola tests of coke: U. S. Geol. Survey Bull. 336, pp. 50, 53, 56, 59, 62.

CLEATON. BEVIER MINE.

Sample.—Bituminous coal, western Kentucky field; analyses Nos. 15339, 15340, and 15341 (p. 40).

Mine.—Bevier, a shaft mine at Cleaton, opposite the railroad station, on the Louisville & Nashville Railroad.

Coal bed.—No. 9 of the Kentucky Geological Survey. Carboniferous age, Pottsville group. Average thickness, 5 feet 4 inches. Dip, 1° southwest. The coal bed has no persistent partings, but contains discontinuous "sulphur" flakes and bands. The roof is a firm, hard, black shale about 6 inches thick; above the shale is a main cap rock. The floor is a hard, smooth fire clay, which crumbles on exposure to the air. The material from the roof and floor did not mix with the coal in mining. Cover at points of sampling, about 130 feet.

The bed was measured and sampled at three points in the mine by H. D. Mason, jr., on December 23, 1912.

Sample 15339 was taken at the face of room 15, off the eighth north air course, 4,100 feet from the shaft. The sample represents 5 feet 3 inches of coal.

Sample 15340 was taken at the face of room 21, off seventh north entry, 3,800 feet from the shaft. The sample represents 5 feet 6 inches of coal.

Sample 15341 was taken at the face of eighth south entry, 4,500 feet from the shaft. The sample represents 5 feet 3 inches of coal.

At all three places some thin "sulphur" bands and flakes were present and are included in the samples.

Notes.—The mine is opened by a shaft 69 feet deep and the coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut by compressed-air machines and broken down with FF black blasting powder. Machine cuttings were loaded with the coal. The tippie had a perforated screen 12 feet long and 5 feet wide, with 1 to 4 inch openings. About 38 per cent of the coal going to the screen passed through the 1-inch holes. Thirty per cent of the coal was shipped as run-of-mine. Pickers were employed on the cars in loading. The lumps loaded were large and of good appearance. There were three loading tracks, with a capacity of 22 empty and 22 loaded cars. The output was about 750 tons a day, all from advance work, but the intent was to increase it to 1,000 tons. There was approximately 900 acres of unmined coal tributary to this tippie.

GRAHAM. SKIBO MINE.

Sample.—Bituminous coal; western Kentucky field; analyses Nos. 16674 and 16675 (p. 41).

Mine.—Skibo, a slope mine, 2 miles north of Graham, on a spur of the Illinois Central Railroad.

Coal bed.—No. 9 of the Kentucky Geological Survey. Carboniferous age. Pottsville group. Average thickness, 4 feet 10 inches; dip, 1 per cent southwest. Only one fault has been encountered; it extends miles. There are no persistent partings in the coal, although "sulphur" occurs in flakes and bands. The roof is a gray shale, 18 inches thick, which comes down with the coal in places; above the shale is a cap rock. The floor is a hard smooth fire clay. Particles from the roof and floor did not mix with the coal in mining. Cover at points of sampling, about 150 feet.

The bed was measured and sampled at two points in the mine by H. D. Mason, jr., on May 5, 1913.

Sample 16674 was cut from the face of west entry 2, off north entry 1, 4,000 feet north of the mine mouth. The bed at this point was 4 feet 10 inches thick. The sample represents the entire section.

Sample 16675 was cut from the face of room 2, off seventh east entry, 3,600 feet north of the mine mouth. The bed at this point was 4 feet 9 inches thick. The sample represents the entire thickness of the bed.

Notes.—The coal is mined by the room-and-pillar double-entry system. At the time of sampling the coal was undercut with chain machines and broken down with FF black blasting powder. The cuttings were loaded out with the coal. About 40 per cent of the coal was shipped as run-of-mine. The tippie had shaking screens 25 feet long and 6 feet wide, with holes 1 to 2½ inches in diameter. About 22 per cent of the coal going to the screens passed through the screens. Pickers were employed on the cars in loading. The lumps were large and of good appearance. There were three loading tracks, with a capacity of 50 empty and 50 loaded cars. The daily output was 922 tons, with a capacity of 1,000 tons. The greater part of the coal was from advance workings, although some of it was from pillars. There were approximately 2,000 acres of unmined coal tributary to this opening.

OHIO COUNTY.

McHENRY. McHENRY MINE.

Sample.—Bituminous coal; western Kentucky field; analyses Nos. 15102 and 15103 (p. 41).

Mine.—McHenry, a slope mine near McHenry, on the Illinois Central Railroad.

Coal bed.—No. 9 of the Kentucky Geological Survey. Carboniferous age, Pottsville group. Thickness, fairly uniform, average 4 feet 6 inches. Roof, dark shale, overlain by a blue sandstone. Floor, hard smooth underclay. Particles of the floor got mixed with the coal in mining.

The bed was measured and sampled at two points in the mine by H. D. Mason, jr., on November 13, 1912.

Sample 15102 was taken at the face of room 4, off south entry 3; 9,000 feet from the mine mouth. The sample includes the entire section, 4 feet 6 inches, except a "sulphur" band 26 inches above the bottom.

Sample 15103 was taken at the face of room 1, off north entry 1; 8,500 feet from the mine mouth. The sample includes the entire section, 4 feet 6 inches, except a "sulphur" band 26 inches above the bottom.

Notes.—The mine was not being operated at the time these samples were taken. In mining, the coal was undercut by hand in the coal and broken down with FF black blasting powder. About 50 per cent of the coal was shipped as run-of-mine. Pickers were employed on the cars. The lumps were large and made a good appearance on the cars. The track had a capacity of 40 loaded cars and 30 empty cars. The average daily production had been 700 tons. There was approximately 1,000 acres of unmined coal tributary to this opening.

PIKE COUNTY.

HELLIER. EDGEWATER MINE.

Sample.—Bituminous coal; Russell Fork field; analysis No. 12004 (p. 41).

Mine.—Edgewater, 1 mile southeast of Hellier post office.

Coal bed.—Upper Elkhorn; Carboniferous age; Kanawha (?) formation. Thickness, 3 feet 6 inches. A sample of run-of-mine coal from this mine was taken on March 28, 1911, by C. H. Wegemann, from three loaded railroad cars, the coal having been mined the previous day.

MISSOURI.^a

ADAIR COUNTY.

KIRKSVILLE. STAR MINE.

Sample.—Bituminous coal; Novinger field; analyses Nos. 14799 and 14800 (p. 41).

Mine.—Star, a shaft mine in the Kirksville district, in sec. 8, T. 63 N., R. 15 W., one-half mile west of Kirksville.

Coal bed.—Bevier. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 14 to 36 inches. Cover, 290 feet. The bed was measured and sampled at two points in the mine by M. Albertson on September 28, 1912.

Sample 14799 was taken 30 feet south of the shaft and represented 17½ inches of coal.

Sample 14880 was taken 12 feet northeast of the shaft and represented 20 inches of coal.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 114, 562.

^a The coal fields of Missouri are described in detail in *The Coal Deposits of Missouri*, by Henry Hinds, Missouri Bureau of Geology and Mines, vol. 11, ser. 2, 1913.

AUDRAIN COUNTY.**MARTINSBURG. No. 1 MINE.**

Sample.—Bituminous coal; Vandalia field; analyses Nos. 11483, 11484, 11485, and 11478 (p. 41).

Mine.—No. 1, a shaft mine in sec. 14, T. 50 N., R. 7 W., one-fourth mile west of Martinsburg, with connections to the Wabash Railroad and the Chicago & Alton Railroad.

Coal bed.—Mulky. Carboniferous age, Pennsylvanian series, Cherokee shale. Average thickness, 2 feet 6 inches; bed practically horizontal. Roof, calcareous shale. Floor, fire clay, 10 inches thick, underlain by limestone. Cover at points of sampling, 135 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on December 19, 1910.

Sample 11483 was taken at the long-wall face, 600 feet south of the shaft.

Sample 11484 was taken at the long-wall face, 600 feet southwest of the shaft.

Sample 11485 was taken at the face, 800 feet southwest of the shaft.

At each of the points sampled the coal bed was 2½ feet thick, overlain by 8 inches of "draw slate," above which was the shale roof. The floor was clay.

A composite sample was made by combining face samples 11483, 11484, and 11485. The results of an ultimate analysis of this sample are given under laboratory No. 11478.

Notes.—The shaft is 135 feet deep; the long-wall system of mining is employed. At the time of sampling the output was 40 tons a day.

BARTON COUNTY.**MINDENMINES. No. 17 MINE.**

Sample.—Bituminous coal; Minden field; analyses Nos. 11185, 11186, 11187, and 11188 (p. 42).

Mine.—No. 17, a shaft mine in sec. 30 T. 32 N., R. 33 W., 2 miles northwest of Mindenmines post office, on the Missouri Pacific Railway.

Coal bed.—Wier-Pittsburg Lower. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 2 feet 10 inches to 3 feet; bed, horizontal. Roof, shale 20 feet thick, overlain by sandstone 2½ feet thick; floor, soft shale. Cover, 60 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on November 11, 1910.

Sample 11185 was taken at the face, 1,000 feet northeast of the shaft, where there was 2 feet 10 inches of clean coal.

Sample 11186 was taken at the face, 1,000 feet southeast of the shaft, where there was 2 feet 10 inches of clean coal.

Sample 11187 was taken at the face, 1,500 feet northwest of the shaft, where there was 2 feet 10 inches of clean coal.

There was shale above and below the coal at each of the points sampled. The samples represent the entire thickness of the bed.

A composite sample was made from face samples 11185, 11186, and 11187. The results of an ultimate analysis of this sample are given under laboratory No. 11188.

Notes.—The shaft is 64 feet deep. The coal is mined by the room-and-pillar system. At the time of sampling the coal was shot off the solid. The mine was comparatively new and was equipped to produce 400 tons a day.

MINDENMINES. PULLEN No. 1 MINE.

Sample.—Bituminous coal; Minden field; analyses Nos. 11177, 11178, 11179, and 11180 (p. 42).

Mine.—Pullen No. 1, a shaft mine in sec. 28, T. 32 N, R. 33 W., 1 mile northeast of Mindenmines post office, on a branch of the Missouri Pacific Railway.

Coal bed.—Wier-Pittsburg Lower. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 2 feet 6 inches. Bed practically horizontal. Roof, shale 5 to 10 feet thick; floor, soft clay. Cover at points of sampling, about 40 feet.

The bed was measured and sampled at three points in Pullen No. 1 mine by R. D. Killian on November 10, 1910.

Sample 11177 was taken at the south face, 600 feet from the shaft, and represents 2 feet 6 inches of coal. There was a "sulphur" band one-sixteenth inch thick near the middle of the bed.

Sample 11178 was taken at the west face, 400 feet from the shaft, and represents 2 feet 7 inches of coal. There was a soft-coal ("mother coal") parting about one-sixteenth inch thick near the middle of the bed.

Sample 11179 was taken at the northeast face, 600 feet from the shaft, and represents 2 feet 6 inches of coal. There was a "sulphur" band one-sixteenth inch thick near the middle of the bed.

A composite sample was made by combining face samples 11177, 11178, and 11179. The results of an ultimate analysis of this sample are given under laboratory No. 11180.

Notes.—The shaft is 40 feet deep. The coal is mined by the room-and-pillar system. At the time of sampling the coal was blasted off the solid. The output was 60 tons a day.

BATES COUNTY.

AMSTERDAM. No. 1 MINE.

Sample.—Bituminous coal; Foster field; analyses Nos. 11306, 11307, 11308, and 11309 (pp. 42, 43).

Mine.—No. 1, in sec. 20, T. 41 N., R. 33 W., in the southern part of the village of Amsterdam, on the Kansas City Southern Railway.

Coal bed.—Mulberry. Carboniferous age, Pennsylvanian series, Pleasonton shale. Thickness variable, average about 2 feet; bed horizontal. Roof, calcareous shale, overlain by limestone; floor, hard clay, underlain by limestone. Cover, 90 to 100 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on December 3, 1910.

Sample 11306 was taken at the face, 400 feet east of the shaft.

Sample 11307 was taken at the face, 400 feet south of the shaft.

Sample 11308 was taken 400 feet southeast of the shaft.

The lower 1 foot of coal in each section contained bands of sulphur and bone.

Each sample represents 2 feet 6 inches of coal, the thickness of the bed.

A composite sample was made by combining face samples 11306, 11307, and 11308. The results of an ultimate analysis of the sample are given under laboratory No. 11309.

Notes.—The shaft is 100 feet deep. The mine is worked by the room-and-pillar system. At the time of sampling the output was about 25 tons a day.

HUME. No. 1 MINE.

Sample.—Bituminous coal; Foster field; analyses Nos. 11226, 11227, 11228, and 11229 (p. 43).

Mine.—No. 1, in sec. 4, T. 38 N., R. 33 W., Howard Township, 4 miles east of Hume and 10 miles west of Rich Hill, on a branch of the St. Louis & San Francisco Railroad.

Coal bed.—Mulberry. Carboniferous age, Pennsylvanian series, Pleasonton shale. Thickness, 2 feet 6 inches to 3 feet. The bed lies horizontal. Roof, "draw slate" 6 inches thick, overlain by shale 15 feet thick; floor, soft clay. Cover, about 50 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on November 21, 1910.

Sample 11226 was taken at the face, 900 feet northwest of the shaft.

Sample 11227 was taken at the face, 1,100 feet west of the shaft.

Sample 11228 was taken at the face, 700 feet southwest of the shaft.

At each of the points sampled the coal bed was $2\frac{1}{2}$ feet thick.

A composite sample was made by combining face samples 11226, 11227, and 11228. The results of an ultimate analysis of this sample are given under laboratory No. 11229.

Notes.—The shaft is 35 feet deep. The coal is mined by the room-and-pillar system. At the time of sampling the capacity was 50 tons a day.

NEW HOME. NEW HOME NO. 1 MINE.

Sample.—Bituminous coal; Rich Hill field; analyses Nos. 11222, 11223, 11224, and 11225 (p. 43).

Mine.—No. 1, a shaft mine in sec. 30, T. 39 N., R. 32 W., at New Home. It has railroad facilities for shipment over the St. Louis & San Francisco, the Missouri Pacific, and the Kansas City Southern railroads.

Coal bed.—Lower Rich Hill. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 5 feet. The bed is horizontal in general but more or less undulating. Roof, limestone, 1 foot thick, overlain by shale about 4 feet thick; floor, clay, 6 feet thick. Cover, 260 to 280 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on November 22, 1910.

Sample 11222 was taken at the face, 200 feet northeast of the shaft, and represents 5 feet of clean coal.

Sample 11223 was measured at the face, 150 feet southeast of the shaft, and represents 5 feet of clean coal.

Sample 11224 was measured at the face, 200 feet south of the shaft, and represents 5 feet of clean coal.

At each of the points sampled the entire thickness of the bed was included.

A composite sample was made by combining face samples 11222, 11223, and 11224. The results of an ultimate analysis of this sample are given under laboratory No. 11225.

Notes.—The shaft is 278 feet deep. The coal is mined by the room-and-pillar system. The output at the time of sampling was about 50 tons a day.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 116, 567.

RICH HILL. FLEMING PIT NO. 1.

Samples.—Bituminous coal; Rich Hill field; analyses Nos. 11197, 11198, 11199, and 11200 (p. 43).

Mine.—Fleming Pit No. 1, an open-pit mine in sec. 36, T. 39 N., R. 32 W., 2 miles northwest of Rich Hill, on a branch of the Missouri Pacific Railway.

Coal bed.—Lower Rich Hill. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 5 feet. The bed lies nearly horizontal. Roof, shale, 4 feet thick; floor, hard clay. Cover, 13 feet.

The bed was measured and sampled at three points in the pit by R. D. Killian on November 19, 1910.

Sample 11197 was taken at the face on the north side of the pit.

Sample 11198 was taken at the face on the east side of the pit.

Sample 11199 was taken at the face on the south side of the pit.

At each of the points sampled the bed was 5 feet thick, and had a 2-inch "sulphur" band 1 foot 10 inches from the bottom. Each sample represents 4 feet 10 inches of coal, the 2-inch band being excluded.

A composite sample was made by combining face samples 11197, 11198, and 11199. The results of an ultimate analysis of this sample are shown under laboratory No. 11200.

Notes.—At the time of sampling Fleming Pit No. 1 was one of the largest strippings near Rich Hill. The daily output was about 50 tons.

RICH HILL. RITCHIE PITS NOS. 1 AND 2.

Sample.—Bituminous coal; Rich Hill field; analyses Nos. 11193, 11194, 11195, and 11196 (p. 44).

Mine.—Ritchie Pits No. 1 and No. 2, in sec. 17, T. 38 N., R. 31 W., 2 miles south of Rich Hill, on a branch of the Missouri Pacific Railroad.

Coal bed.—Lower Rich Hill. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, about 5 feet. The bed is slightly inclined. Roof, black shale, 4 feet thick; floor, clay. Cover, 10 to 16 feet.

The bed was measured and sampled at two points in No. 1 pit and at one point in No. 2 pit by R. D. Killian on November 18, 1910.

Sample 11193 was taken at the face on the north side of open pit No. 1.

Sample 11194 was taken at the face on the south side of open pit No. 1.

At each of the above points the bed measured 4 feet 11 inches. There was a "sulphur" band 1 inch thick at the bottom and a 2-inch band of "lignite" about 1 foot 8 inches from the bottom. These parts were excluded from the samples.

A composite sample was made by combining face samples 11193 and 11194. The results of an ultimate analysis of this sample are given under laboratory No. 11195.

Sample 11196 was cut from the face of the south side of open pit No. 2. The bed measured 2 feet at this point, all of which is represented in the sample.

Notes.—At pit No. 1 a slope had been opened and underground work was being carried on. The output was 30 tons a day.

BOONE COUNTY.

COLUMBIA. NO. 1 AND NO. 2 MINES.

Samples.—Bituminous coal; Bevier field; analyses Nos. 11475, 11476, and 11477 (p. 44).

Mines.—No. 1 and No. 2, shaft mines in the Columbia district, in sec. 4, T. 48 N., R. 12 W., $3\frac{1}{2}$ miles northeast of Columbia, a shipping station on the Wabash Railroad.

Coal bed.—Bevier (?). Carboniferous age, Pennsylvanian series, Cherokee shale. Average thickness, 3 feet; slight dip to southeast. Roof, blue calcareous shale, 3 feet thick; floor, fire clay. Cover, 100 to 110 feet.

The bed was measured and sampled at two points in No. 1 mine and at one point in No. 2 mine by R. D. Killian on December 17, 1910.

Sample 11475 was taken at the face, 50 feet west of the shaft, mine No. 2.

Sample 11476 was taken at the face, 110 feet north of the shaft, mine No. 1.

Sample 11477 was taken 50 feet west of the shaft, mine No. 1.

Each sample represents 3 feet of coal, the thickness of the bed.

Notes.—The shafts are 110 feet deep. The coal is mined by the room-and-pillar system. At the time of sampling the output was 30 tons a day. The coal was used for local consumption.

COLUMBIA. PRATHER NO. 1 MINE.

Sample.—Bituminous coal; Bevier field; analyses Nos. 11479, 11480, 11481, and 11482 (p. 44).

Mine.—Prather No. 1, a shaft mine in sec. 11, T. 49 N., R. 12 W., $4\frac{1}{2}$ miles north of Columbia, which is the nearest shipping point on the Wabash Railroad.

Coal bed.—Bevier. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 40 to 42 inches. The bed is more or less undulating with a slight dip to the southeast. Roof, black shale; floor, hard fire clay. Cover, 35 to 65 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on December 17, 1910.

Sample 11479 was taken at the face, 600 feet southwest of the shaft.

Sample 11480 was taken at the face, 600 feet west of the shaft.

Sample 11481 was taken at the face, 800 feet east of the shaft.

At each of the points sampled the bed was 3 feet 6 inches thick, all of which was included in the sample.

There is an 18-inch bed of coal 30 feet above the bed mined and an 18-inch bed of coal about 10 feet below it.

A composite sample was made from face samples 11479, 11480, and 11481. The results of an ultimate analysis of this sample are given under laboratory No. 11482.

Notes.—The shaft is 36 feet deep. The coal is mined by the room-and-pillar method. At the time of sampling the capacity was 35 tons a day; the coal was used for local purposes.

CALLAWAY COUNTY.

FULTON. NO. 1 MINE.

Sample.—Bituminous coal; Bevier field; analyses Nos. 11501, 11502, 11503, and 11504 (p. 45).

Mine.—No. 1, a shaft mine in sec. 18, T. 47 N., R. 9 W., 2 miles southwest of Fulton, on a spur of the Chicago & Alton Railroad.

Coal bed.—Bevier. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 2 feet 6 inches. The bed lies practically horizontal. Roof, soft shale mixed with clay, about 12 inches thick, above the shale is a limestone cap rock 14 feet thick; floor, hard fire clay. Cover, 90 to 110 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on December 20, 1910.

Sample 11501 was taken at the face, 1,000 feet east of the shaft.

Sample 11502 was taken at the face, 600 feet northeast of the shaft.

Sample 11503 was taken at the face, 600 feet southwest of the shaft.

Each sample represents 2 feet 6 inches of coal, the thickness of the bed.

A composite sample was made by combining face samples 11501, 11502, and 11503. The results of an ultimate analysis of this sample are given under laboratory No. 11504.

Notes.—The mine is opened by a shaft 92 feet deep and is worked by the longwall system. At the time of sampling the output was 40 tons a day; most of the coal was used locally.

HARRISON COUNTY.

CAINESVILLE. CAINESVILLE MINE.

Sample.—Bituminous coal; Cainesville field; analyses Nos. 12679, 12680, and 12681 (p. 45).

Mine.—Cainesville, a shaft mine in sec. 13, T. 65 N., R. 26 W., at Cainesville, on the Chicago, Burlington & Quincy Railroad.

Coal bed.—Cainesville. Carboniferous age, Pennsylvanian series, Cherokee shale. Roof, drab to black shale; floor, hard sandy clay. Thickness, 3 feet 8 inches to 5 feet; average, 4 feet. Cover, 480 feet.

The bed was measured and sampled at three points in the mine by Henry Hinds on September 26, 1911.

Sample 12679 was taken in the main west air course, 600 feet west and 50 feet north of the shaft, and represents 3 feet 10½ inches of coal.

Sample 12680 was taken in south entry 2, off the main east entry, 150 feet east and 350 feet south of the shaft, and represents 3 feet 9½ inches of coal.

Sample 12681 was taken in south entry 2, off the main west entry, 400 feet southwest of the shaft, and represents 3 feet 9¼ inches of coal. Each sample represents the entire thickness of the bed.

MELBOURNE. TRENTON No. 1 MINE.

Sample.—Bituminous coal; analyses Nos. 11374, 11375, 11376, and 11377 (p. 45).

Mine.—Trenton No. 1, a shaft mine in sec. 25, T. 62 N., R. 26 W., one-fourth mile east of Melbourne, near the county line, and on the Quincy, Omaha & Kansas City Railroad.

Coal bed.—Lexington. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 3 feet. The bed lies practically horizontal. Roof, shale 8 inches thick, overlain by calcareous shale 2 feet thick. Floor, hard clay. Cover, 138 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on December 7, 1910.

Sample 11374 was taken at the face, 90 feet south of the shaft.

Sample 11375 was taken at the face, 85 feet northeast of the shaft.

Sample 11376 was taken at the face, 30 feet north of the shaft.

At each of the points sampled the bed was 3 feet thick. There was a 2-inch band of clay and "sulphur" 1 foot below the top of the coal. This was excluded in sampling the coal. There was shale above the coal. Below the coal was soft clay about 3 inches thick, underlain by hard clay.

A composite sample was made by combining face samples 11374, 11375, and 11376. The results of an ultimate analysis of this sample are given under laboratory No. 11377.

Notes.—The mine is opened by a shaft about 140 feet deep and is worked by the longwall system. At the time of sampling the output was 25 tons a day.

HENRY COUNTY.

CALHOUN. PARKS No. 1 MINE.

Sample.—Bituminous coal; Lewis field; analyses Nos. 11314, 11315, 11316, and 11317 (p. 46).

Mine.—Parks No. 1, a drift mine in sec. 25, T. 34 N., R. 26 W., 2½ miles west of Calhoun, on the Missouri, Kansas & Texas Railway.

Coal bed.—Tebo. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 2 feet 8 inches. The bed lies horizontal. Roof, shale 3½ feet thick, overlain by limestone 20 inches thick. Floor, soft fire clay. Cover, about 15 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on November 30, 1910.

Sample 11314 was taken at the face, 700 feet southeast of the mine mouth.

Sample 11315 was taken at the face, 700 feet southwest of the mine mouth.

Sample 11316 was taken at the face, 800 feet west of the mine mouth.

At each of the points sampled the bed measured 2 feet 8 inches. There was a "sulphur" band 1 inch thick about 1 foot 4 inches from the top of the coal. This was excluded in sampling.

A composite sample was made by combining face samples 11314, 11315, and 11316. The results of an ultimate analysis of this sample are given under laboratory No. 11317.

Notes.—The coal is mined by the longwall system. At the time of sampling the output was 35 tons a day.

CLINTON. LANE NO. 1 MINE.

Sample.—Bituminous coal; Lewis field; analyses Nos. 11248, 11249, 11250, and 11251 (p. 46).

Mine.—Lane No. 1, a slope mine in sec. 28, T. 42 N., R. 26 W., $3\frac{1}{2}$ miles northwest of Clinton, with connections to the St. Louis & San Francisco Railroad.

Coal bed.—Tebo. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 2 feet 6 inches. The bed dips slightly. Roof, calcareous shale; floor, clay. Cover, 18 to 20 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on November 25, 1910.

Sample 11248 was taken at the face, 210 feet northwest of the mine mouth, and represents 2 feet 6 inches of clean coal.

Sample 11249 was taken at the face, 300 feet northeast of the mine mouth, and represents 2 feet 6 inches of clean coal.

Sample 11250 was taken at the face, 230 feet north of the mine mouth, and represents 2 feet 6 inches of clean coal.

At each of the points sampled the entire thickness of the bed was included.

A composite sample was made from face samples 11248, 11249, and 11250. The results of an ultimate analysis of this sample are given under laboratory No. 11251.

Notes.—The mine is worked by the longwall system. At the time of sampling the daily output was 20 tons.

CLINTON. NEIL NO. 1 MINE.

Sample.—Bituminous coal; analyses Nos. 11302, 11303, 11304, and 11305 (p. 46).

Mine.—Neil No. 1, a shaft mine in sec. 34, T. 42 N., R. 26 W., 1 mile north of Clinton, on the St. Louis & San Francisco Railroad.

Coal bed.—Not correlated. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 2 feet 6 inches. The bed lies practically horizontal. Roof, siliceous limestone 6 feet thick; floor, clay. Cover at points of sampling, 25 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on December 1, 1910.

Sample 11302 was taken at the face, 200 feet southwest of the shaft.

Sample 11303 was taken at the face, 100 feet northwest of the shaft.

Sample 11304 was taken 75 feet east of the shaft.

At each of the points sampled the bed was 2 feet 6 inches thick, with a 2-inch "sulphur" band 10 inches from the top. This was excluded from the samples, which represent 2 feet 4 inches of coal.

A composite sample was made by combining face samples 11302, 11303, and 11304. The results of an ultimate analysis of this sample are given under laboratory No. 11305.

Notes.—The mine is opened by a shaft about 30 feet deep and is worked by the longwall method. At the time of sampling the output was 12 tons a day. The coal was used for local purposes.

CLINTON. PHARIS NO. 1 MINE.

Sample.—Bituminous coal; Jordan field; analyses Nos. 11370, 11371, 11372, and 11373 (p. 47).

Mine.—Pharis No. 1, a shaft mine in sec. 7, T. 41 N., R. 26 W., 2 miles east of Clinton, on the St. Louis & San Francisco Railroad.

Coal bed.—Jordan. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 1 foot 10 inches. The bed lies practically horizontal. Roof, blue shale $2\frac{1}{2}$ feet thick overlain by calcareous shale 10 feet thick; floor, fire clay. Cover at point of sampling, 30 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on December 1, 1910.

Sample 11370 was taken at the face, 100 feet west of the shaft.

Sample 11371 was measured at the face, 100 feet south of the shaft.

Sample 11372 was measured at the face, 50 feet east of the shaft.

At each of the points sampled the bed was 1 foot 10 inches thick, with a 2-inch "sulphur" band about 8 inches from the top of the bed. This was excluded in sampling, each sample representing 1 foot 8 inches of coal.

A composite sample was made by combining face samples 11370, 11371, and 11372. The results of an ultimate analysis of this sample are given under laboratory No. 11373.

Notes.—The mine is opened by a shaft about 35 feet deep, and is worked by the room-and-pillar system. The daily output at the time of sampling was 14 tons.

CLINTON. SHELDON No. 1 MINE.

Sample.—Bituminous coal, Jordan field; analyses Nos. 11262, 11263, 11264, and 11265 (p. 47).

Mine.—Sheldon No. 1, a shaft mine in sec. 25, T. 41 N., R. 26 W., 3 miles southeast of Clinton, on the St. Louis & San Francisco Railroad and the Kansas City Southern Railway.

Coal bed.—Jordan. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 2 feet 2 inches. The bed lies practically horizontal. Roof, shale, 7 feet thick; floor, fire clay. Cover at points of sampling, 35 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on November 23, 1910.

Sample 11262 was taken at the face, 80 feet southwest of the shaft, and represents 2 feet 2 inches of clean coal.

Sample 11263 was taken at the face, 110 feet south of the shaft, and represents 2 feet 2 inches of clean coal.

Sample 11264 was taken at the face, 110 feet southeast of the shaft, and represents 2 feet 2 inches of clean coal.

At each of the points sampled the entire thickness of the bed was included.

A composite sample was made from face samples 11262, 11263, and 11264. The results of an ultimate analysis of this sample are given under laboratory No. 11265.

Notes.—The shaft is about 40 feet deep. The coal is mined by the longwall system. At the time of sampling the output was 20 tons a day.

DEEPWATER. DICKEY No. 1 PIT.

Sample.—Bituminous coal, Jordan field; analyses Nos. 11310, 11311, 11312, and 11313 (p. 47).

Mine.—Dickey No. 1, an open-pit mine in sec. 14, T. 40 N., R. 26 W., in the eastern part of the city of Deepwater, on the Kansas City, Clinton & Springfield Railway.

Coal bed.—Jordan. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 26 inches. The bed is horizontal. Roof, shale, 2 to 4 feet thick, overlain by 15 feet of clay and soil; floor, fire clay.

The bed was measured and sampled at three points in the pit by R. D. Killian on December 1, 1910.

Sample 11310 was taken at the face on the north side of the pit.

Sample 11311 was taken at the face on the east side of the pit.

Sample 11312 was taken at the face on the west side of the pit.

At each of the points sampled the bed was 2 feet 2 inches thick, with a 2-inch "sulphur" band about 8 inches from the top. This band was excluded from the samples, which represent 2 feet of coal.

A composite sample was made from face samples 11310, 11311, and 11312. The results of an ultimate analysis of this sample are given under laboratory No. 11313.

Notes.—The mine is worked as an open pit. At the time of sampling the output was 10 tons a day, for local use.

DEEPWATER. HURST No. 1 MINE.

Sample.—Bituminous coal, Jordan field; analyses Nos. 11252, 11253, 11254, and 11255 (p. 47).

Mine.—Hurst No. 1, a shaft mine in sec. 13, T. 40 N., R. 26 W., three-fourths of a mile east of Deepwater, with connections to the St. Louis & San Francisco Railroad.

Coal bed.—Jordan. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 3 feet 4 inches. The bed lies practically horizontal. Roof, dark gray shale; floor, soft clay. Cover, 54 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on November 26, 1910.

Sample 11252 was taken at the face, 100 feet northeast of the shaft, and represents 3 feet 4 inches of clean coal.

Sample 11253 was taken at the face, 350 feet west of the shaft, and represents 3 feet 4 inches of clean coal.

Sample 11254 was taken at the face, 450 feet northwest of the shaft, and represents 3 feet 4 inches of clean coal.

At each of the points sampled the entire thickness of the bed was included.

A composite sample was made by combining face samples 11252, 11253, and 11254. The results of an ultimate analysis of this sample are given under laboratory No. 11255.

Notes.—The shaft is 60 feet deep. The room-and-pillar system of mining is employed. The coal is delivered to the railroad by a tramway 1,100 feet long. At the time of sampling the output was 65 tons a day. The coal was marketed in the neighboring towns along the Frisco Railroad.

LEWIS. PIGG No. 1 MINE.

Sample.—Bituminous coal, Lewis field; analyses Nos. 11267, 11268, 11269, and 11270 (p. 48).

Mine.—Pigg No. 1, a shaft mine in sec. 9, T. 42 N., R. 25 W., three-fourths of a mile north of Lewis, connected by a tramway to the Missouri, Kansas & Texas Railway.

Coal bed.—Tebo. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 2 feet 6 inches. The bed lies practically horizontal. Roof, shale 3 feet thick, overlain by hard limestone 10 to 20 inches thick; floor, soft clay. Cover at points of sampling, 34 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian, on November 28, 1910.

Sample 11267 was taken at the face, 1,300 feet west of the shaft, and represents 2 feet 6 inches of clean coal.

Sample 11268 was taken at the face, 1,300 feet southwest of the shaft, and represents 2 feet 6 inches of coal.

Sample 11269 was taken at the face, 1,400 feet southwest of the shaft, and represents 2 feet 6 inches of coal.

At each of the points sampled the entire thickness of the bed was included.

A composite sample was made by combining face samples 11267, 11268, and 11269. The results of an ultimate analysis of this sample are given under laboratory No. 11270.

Notes.—The mine is opened by a shaft 50 feet deep and is worked by the longwall system. At the time of sampling, punching machines operated by compressed air were used for undercutting the coal. The daily output was 65 tons.

LINN COUNTY.

BROOKFIELD. CRANDALL No. 1 MINE.

Sample.—Bituminous coal; Marceline field; analyses Nos. 11421, 11422, 11423, and 11424 (p. 48).

Mine.—Crandall No. 1, a shaft mine in sec. 20, T. 57 N., R. 19 W., $1\frac{1}{4}$ miles east of Brookfield near the Chicago, Burlington & Quincy Railroad.

Coal bed.—Tebo. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 2 feet 2 inches. The bed lies horizontal. Roof, fire clay, 4 inches thick, overlain by blue shale 51 feet thick; floor, soft fire clay 3 inches thick, underlain by hard clay. Cover, 155 feet..

The bed was measured and sampled at three points in the mine by R. D. Killian, on December 12, 1910.

Sample 11421 was taken at the face, 750 feet southeast of the shaft.

Sample 11422 was taken at the face, 750 feet southwest of the shaft.

Sample 11423 was taken at the face, 800 feet east of the shaft.

At each of the points sampled the bed was 2 feet 5 inches thick, with a 3-inch parting of soft fire clay, about 2 feet 2 inches from the top. Each sample represents 2 feet 2 inches of coal, the parting being excluded.

A composite sample was made by combining face samples 11421, 11422, and 11423. The results of an ultimate analysis of this sample are given under laboratory No. 11424.

Notes.—The shaft is 140 feet deep. The longwall system of mining is employed. At the time of sampling the daily output was 20 tons. The entire output was sold in and around Brookfield.

BROOKFIELD. WALKER No. 1 MINE.

Sample.—Bituminous coal; Marceline field; analyses Nos. 11413, 11414, 11415, and 11416 (p. 49).

Mine.—Walker No. 1, a shaft mine in sec. 16, T. 57 N., R. 19 W., 3 miles southeast of Brookfield, on the Chicago, Burlington & Quincy Railroad.

Coal bed.—Tebo. Carboniferous age, Pennsylvanian series, Cherokee formation. Thickness, 2 feet 2 inches. The bed lies practically horizontal. Roof, blue shale; floor, soft clay 4 inches thick, underlain by hard clay. Cover at points of sampling, 170 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on December 12, 1910.

Sample 11413 was taken at the face, 250 feet southwest of the shaft.

Sample 11414 was taken at the face, 200 feet northeast of the shaft.

Sample 11415 was taken at the face, 200 feet southeast of the shaft.

At each of the points sampled the bed was 2 feet 2 inches thick, all of which is represented in the samples.

A composite sample was made by combining face samples 11413, 11414, and 11415. The results of an ultimate analysis of this sample are given under laboratory No. 11416.

Notes.—The shaft is about 175 feet deep. The mine is worked by the longwall method. At the time of sampling the daily output was 10 tons; it was used locally.

MARCELINE. LANDRETH No. 1 MINE.

Sample.—Bituminous coal; Marceline field; analyses Nos. 11417, 11418, 11419, and 11420 (p. 49).

Mine.—Landreth No. 1, a shaft mine in sec. 20, T. 57 N., R. 18 W., three-fourths of a mile west of Marceline, near the Atchison, Topeka & Santa Fe Railway.

Coal bed.—Tebo. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 2 feet 4 inches. The bed lies practically horizontal. Roof, soft blue shale 31 feet thick; floor, clay. Cover, 130 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on December 13, 1910.

Sample 11417 was taken at the face, 600 feet east of the shaft, and represents 2 feet 4 inches of clean coal.

Sample 11418 was taken at the face, 600 feet north of the shaft, and represents 2 feet 4 inches of clean coal.

Sample 11419 was taken at the face, 600 feet south of the shaft, and represents 2 feet 4 inches of coal.

At each of the points sampled the entire thickness of the bed was included.

A composite sample was made by combining face samples 11417, 11418, and 11419. The results of an ultimate analysis of this sample are given under laboratory No. 11420.

Notes.—The mine is opened by a shaft about 130 feet deep, and is worked by the longwall system. At the time of sampling the daily output was 25 tons. The coal is hauled by wagon to Marceline, where it is used for domestic and steaming purposes.

PUTNAM COUNTY.

MENDOTA. MENDOTA No. 2 MINE.

Sample.—Bituminous coal; Mendota field; analyses Nos. 11398, 11399, 11400, and 11401 (p. 49).

Mine.—Mendota No. 2, a shaft mine in sec. 1, T. 66 N., R. 18 W., 1 mile south-east of Mendota on the Chicago, Burlington & Quincy Railroad.

Coal bed.—Lexington. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 3 feet. The bed lies horizontal. Roof, shale 18 inches thick, overlain by calcareous shale 16 feet thick; floor, hard fire clay. Cover, 65 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on December 10, 1910.

Sample 11398 was taken at the face, 2,500 feet southwest of the shaft.

Sample 11399 was taken at the face, 3,200 feet south of the shaft.

Sample 11400 was taken at the face, 3,100 feet southeast of the shaft.

At each of the places sampled the coal was 3 feet thick, with a 2-inch clay parting about the middle of the bed. The parting was excluded from the samples.

A composite sample was made from face samples 11398, 11399, and 11400. The results of an ultimate analysis of this sample are given under laboratory No. 11401.

Notes.—The shaft is 67 feet deep. A combination of the room-and-pillar and the longwall systems of mining are used. At the time of sampling the output was 100 tons a day. The coal was used for domestic fuel and steaming purposes.

UNIONVILLE. ANDERSON MINE.

Sample.—Bituminous coal; Mendota field; analyses Nos. 14880 and 14881 (p. 49).

Mine.—Anderson, a shaft mine, Unionville district; NW. $\frac{1}{4}$ sec. 30, T. 66 N., R. 19 W.; $2\frac{1}{2}$ miles northeast of Unionville.

Coal bed.—Lexington. Carboniferous age; Pennsylvanian series; Cherokee shale. Roof, black "slaty" shale, overlain by limestone; floor, clay. Thickness, 32 inches, fairly uniform.

The bed was measured and sampled at two points in the mine by M. Albertson on October 10, 1912, as described below.

Sections of coal bed in Anderson mine.

Section.....	A	B
Laboratory No.....	14880	14881
Coal.....	<i>Ft. in.</i> 1 7	1 6
Clay.....	0 2½	0 2½
Coal.....	0 11	0 11
Clay.....	.. ..	0 1½
Coal.....	.. ..	0 1½
Thickness of bed.....	2 8½	2 10½
Thickness of coal sampled.....	2 6	2 0½

α Excluded from sample.

Section A (sample 14880) was taken 175 feet southwest of the shaft.

Section B (sample 14881) was taken 150 feet east of the shaft.

RANDOLPH COUNTY.**HUNTSVILLE. CARSON NO. 1 MINE.**

Sample.—Bituminous coal, Bevier field; analyses Nos. 11452, 11453, 11454, and 11455 (p. 50).

Mine.—Carson No. 1, a shaft mine in the Huntsville district; sec. 36, T. 54 N., R. 15 W.; in the southern part of Huntsville, on the Wabash Railroad.

Coal bed.—Bevier. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 4 feet. The bed lies horizontal. Roof, blue calcareous shale 20 feet thick; floor, hard fire clay. Cover at points of sampling, 40 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on December 14, 1910.

Sample 11452 was taken at the face, 250 feet southeast of the shaft, and represents 4 feet of clear coal, the thickness of the bed.

Sample 11453 was taken at the face, 300 feet north of the shaft, and represents 4 feet of clear coal, the thickness of the bed.

Sample 11454 was taken at the face, 200 feet southwest of the shaft, and represents 4 feet of clear coal, the thickness of the bed.

A composite sample was made by combining face samples 11452, 11453, and 11454. The results of an ultimate analysis of this sample are given under laboratory No. 11455.

Notes.—The mine is opened by a shaft about 40 feet deep; it is worked by the room-and-pillar system. At the time of sampling the daily output was 10 tons. The coal is sold in the local markets at Huntsville.

HUNTSVILLE. NORTHERN NO. 2 MINE.

Sample.—Bituminous coal; Bevier field; analyses Nos. 11448, 11449, 11450, and 11451 (p. 50).

Mine.—Northern No. 2, a shaft mine in the Huntsville district; SE. ¼ sec. 36, T. 54 N., R. 15 W.; three-fourths of a mile south of Huntsville, on the Wabash Railroad.

Coal bed.—Bevier. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 4 feet. The bed lies horizontal. Roof, blue calcareous shale 30 feet thick; floor, hard fire clay. Cover at points of sampling 70 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on December 14, 1910.

Sample 11448 was taken at the face, 4,000 feet south of the shaft, and represents 4 feet of clear coal.

Sample 11449 was taken at the face, 3,800 feet northeast of the shaft, and represents 4 feet of clear coal.

Sample 11450 was taken at the face, 3,500 feet southeast of the shaft, and represents 4 feet of clear coal.

A composite sample was made by combining face samples 11448, 11449, and 11450. The results of an ultimate analysis of this sample are given under laboratory No. 11451.

Notes.—The shaft is about 70 feet deep; the room-and-pillar system of mining is used. At the time of sampling the output was 600 tons a day.

RENICK. ORRIS No. 1 MINE.

Sample.—Bituminous coal; Bevier field; analyses Nos. 11497, 11498, 11499, and 11500 (pp. 50, 51).

Mine.—Orris No. 1, a shaft mine in the Higbee district; sec. 31, T. 53 N., R. 13 W., one-quarter mile west of Renick, on the Wabash Railroad.

Coal bed.—Mulky. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness 1 foot 6 inches. The bed lies horizontal. Roof, shale 4 feet thick, overlain by limestone 6 feet thick; floor, fire clay 1 foot 6 inches thick. Cover at points of sampling, 60 feet.

The bed was measured and sampled at three places in the mine by R. D. Killian on December 15, 1910.

Sample 11497 was taken at the face, 300 feet southwest of the shaft.

Sample 11498, was taken at the face, 300 feet northwest of the shaft.

Sample 11499 was taken at the face, 300 feet west of the shaft.

At each of the points sampled the bed was 1 foot 6 inches thick, all of which was included in sampling.

A composite sample was made by mixing face samples 11497, 11498, and 11499. The results of an ultimate analysis of this sample are given under laboratory No. 11500.

Notes.—The shaft is about 60 feet deep; the room-and-pillar system of mining is employed. At the time of sampling the daily output was 10 tons; the coal was sold in local markets.

RAY COUNTY.

VIBBARD. VIBBARD No. 1 MINE.

Sample.—Bituminous coal; Lexington field; analyses Nos. 11365, 11366, 11367, and 11368 (p. 51).

Mine.—Vibbard No. 1, a shaft mine in the Richmond district; sec. 27, T. 53 N., R. 29 W.; one-fourth of a mile south of Vibbard, on the Atchison, Topeka & Santa Fe Railway.

Coal bed.—Lexington. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 2 feet 2 inches. The bed lies horizontal. Roof, "slate" 8 inches thick, overlain by calcareous shale 7 feet thick; floor, clay. Cover at points of sampling, 400 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on December 5, 1910.

Sample 11365 was taken at the face, 250 feet south of the shaft.

Sample 11366 was taken at the face, 250 feet east of the shaft.

Sample 11367 was taken at the face, 200 feet west of the shaft.

At each of the points sampled the bed was 2 feet 2 inches thick, with a 2-inch "sulphur" band 8 inches from the top. Each sample represents 2 feet of coal, the 2-inch band being excluded.

A composite sample was made by combining face samples 11365, 11366, and 11367. The results of an ultimate analysis of this sample are given under laboratory No. 11368.

Notes.—The mine is worked by the longwall system; at the time of sampling the output was 12 tons a day. The coal was sold in the local market.

VERNON COUNTY.

MOUNDVILLE. BROWN NO. 1 MINE.

Sample.—Bituminous coal; analyses Nos. 11201, 11202, 11203, and 11204 (p. 51).

Mine.—Brown No. 1, a shaft mine in sec. 5, T. 34 N., R. 32 W., at the northwest corner of Moundville, on the Missouri Pacific Railway.

Coal bed.—Not correlated. Carboniferous age, Pennsylvanian series. Thickness, 5 feet 10 inches. The bed lies horizontal. Roof, dark bluish shale 8 feet thick; floor, hard shale. Cover at points of sampling, 28 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on November 15, 1910.

Sample 11201 was taken at the face, 40 feet northwest of the shaft.

Sample 11202 was taken at the face, 100 feet northeast of the shaft.

Sample 11203 was taken at the face, 125 feet north of the shaft.

Each sample represents 2 feet 2 inches of coal. A lower bench of coal, 2 feet 4 inches thick, was separated from the one sampled by 1 foot 4 inches of shale.

A composite sample was made by combining face samples 11201, 11202, and 11203. The results of an ultimate analysis of this sample are given under laboratory No. 11204.

Notes.—The shaft is 26 feet deep; the mine is worked by room-and-pillar system. At the time of sampling the daily output was 40 tons.

PANAMA. JONES NO. 1 MINE.

Sample.—Bituminous coal; Rich Hill field; analyses Nos. 11205, 11206, 11207, and 11208 (p. 51).

Mine.—Jones No. 1, a shaft mine in sec. 4, T. 37 N., R. 31 W., 2 miles south of Panama, on the Missouri Pacific Railway.

Coal bed.—Rich Hill. Carboniferous age, Pennsylvanian series, Cherokee shale. Thickness, 5 feet. The bed lies practically horizontal. *Roof, shale 1 foot thick; floor, soft shale. Cover 40 to 60 feet.

The bed was measured and sampled at three points in the mine by R. D. Killian on November 16, 1910.

Sample 11205 was taken at the face, 450 feet east of the shaft.

Sample 11206 was taken at the face, 1,000 feet southeast of the shaft.

Sample 11207 was taken at the face, 100 feet east of the shaft.

At each of the points sampled the coal bed was 5 feet thick. Above the coal was a "sulphur" band 5 inches thick, which was overlain by the shale roof. There was shale below the coal.

A composite sample was made by combining face samples 11205, 11206, and 11207. The results of an ultimate analysis of this sample are shown under laboratory No. 11208.

Notes.—The shaft is 27 feet deep; the mine is worked by the room-and-pillar system. At the time of sampling the coal was blasted off the solid; the daily output was 100 tons.

MONTANA.

BLAINE COUNTY.

CLEVELAND. COOK MINE.

Sample.—Subbituminous coal; Cleveland field; analysis No. 14782 (p. 52).

Mine.—Cook; SW. $\frac{1}{4}$ sec. 35, T. 30 N., R. 20 E., about 4 miles northeast of Cleveland post office.

Coal bed.—Not named; Judith River formation; Cretaceous age. The bed was measured and sampled at one point in the mine by C. F. Bowen and Harvey Bassler on September 22, 1912, as shown below:

Section of coal bed in Cook mine.

Laboratory No.....	14782
Roof, shale.....	<i>Ft. in.</i>
Coal.....	1 3
Clay.....	0 5½
Coal.....	1 10
Floor, shale.....	
Thickness of bed.....	3 6½
Thickness of coal sampled.....	3 1

a Not included in sample.

The sample was taken from the face of the entry, about 500 feet from the mine mouth.

Notes.—The mine was operated during the winter months and has an output of about 600 tons a year.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 541. (In press).

CARBON COUNTY.

BEAR CREEK. NO. 2 MINE.

Sample.—Subbituminous coal; Red Lodge field; analyses Nos. 15145 and 15151; 15146 and 15152; 15147 and 15153; 15148 and 15154; 15149 and 15155; and 15150 and 15156. (pp. 52, 53).

Mine.—No. 2, a drift mine in sec. 6, T. 8 S., R. 21 E., 1½ miles west of Bear Creek, on the Montana, Wyoming & Southern Railroad.

Coal bed.—No. 2, Tertiary age, Fort Union formation. Average thickness, 6 feet 6 inches; dip, about 5° southwest, not uniform. Roof, dark shale 4 to 10 feet thick, overlain by sandstone; floor, soft smooth fire clay. Particles of the roof and floor did not mix with the coal in mining. Cover at the points of sampling, 85 to 105 feet.

The bed was measured and sampled at five points in the mine by O. U. Bradley on November 28 to 30, 1912, as described below:

Sections of coal bed in No. 2 mine.

Section.....	A	B	C	D	E
Laboratory No.....	15145 15151	15146 15152	15147 15153	15148 15154	15149 15155
Roof, clay (overlain by shale).....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 4	0 6	0 5	0 7	0 5
Coal, bony.....	0 3	0 ½	0 3	0 3½	0 2½
Coal.....	2 7	2 8	4 10½	2 8	2 5
Clay and bony coal.....	0 1	0 ½	.. ..	0 ..	0 ½
Coal.....	0 3	.. ..	.. ..	0 3½	0 3
Clay or bony coal.....	0 ½	.. ..	.. ..	0 ..	0 ½
Coal.....	2 8	3 1	.. ..	2 5	2 4½
Floor, fire clay.....					
Thickness of bed.....	6 2½	6 4	5 6½	6 3½	5 9
Thickness of coal sampled.....	6 2½	6 4	5 6½	6 3½	5 9

Section A (samples 15145 and 15151) was measured on a pillar between rooms 9 and 10, off north entry 2.

Section B (samples 15146 and 15152) was measured at the face of room 10; 125 feet off west entry 1.

Section C (samples 15147 and 15153) was measured at the face of room 9, 45 feet off east entry 9.

Section D (samples 15148 and 15154) was measured at the face of the cut-through in room 22, off east entry 4.

Section E (samples 15149 and 15155) was measured at the face of room 11, 35 feet off rock tunnel entry.

A composite sample was made by mixing samples 15146, 15147, 15148, and 15149. The results of an ultimate analysis of this sample are shown under laboratory No. 15150.

A composite sample was made by mixing samples Nos. 15152, 15153, 15154, and 15155. The results of an ultimate analysis of this sample are shown under laboratory No. 15156.

Notes.—The coal is mined by the room-and-pillar system. At the time of sampling, the coal was undercut by chain cutting machines and broken down with FF black blasting powder. None of the coal was shipped as run-of-mine. The tippie was equipped with shaking screens 12 feet long and 5 feet wide with openings $2\frac{1}{2}$ by 4 inches, screens 5 feet wide and 12 feet long, with 2-inch openings, and a revolving screen 12 feet long with $\frac{3}{4}$ and $1\frac{1}{4}$ inch openings. About 50 per cent of the coal passed through the larger screens. The screenings were conveyed by an aerial tramway to the dirt dump. There were no pickers employed. The lumps were large and appeared to be clean coal. There were two loading tracks with a capacity of 20 empty and 20 loaded cars. The daily output of the mine was about 800 tons. The intent was to increase the output to 1,000 or 1,200 tons when the No. 3 seam is opened.

BEAR CREEK. NORTH SIDE AND SOUTH SIDE MINES.

Sample.—Subbituminous coal; Red Lodge field; analyses Nos. 15127 and 15133, 15128 and 15132, 15129 and 15131, 15143 and 15144, and 15130 and 15134 (p. 53).

Mine.—The North Side and South Side mines are opened by drifts in sections 5 and 6, T. 8 S., R. 21 E. The tippie is 1 mile west of Bear Creek, on the Montana, Wyoming & Southern Railroad.

Coal bed.—No. 3, Tertiary age, Fort Union formation. Average thickness, 6 feet 3 inches; dip, about 4° southwest. The cleat is poorly defined. The coal bed has two irregular bone partings. The roof is a dark blue shale which occasionally comes down with the coal; above the shale is a sandstone cap rock. The floor is a soft smooth fire clay. There is a workable coal bed 80 feet above and one 60 feet below this bed. At the time of sampling, particles of the roof and floor mixed with the coal in mining. Cover at the points of sampling, 75 to 130 feet.

The bed was measured and sampled at three points in the South Side mine on November 25, 1912, and at one point in the North Side mine on December 1, 1912, by O. U. Bradley, as described below:

Sections of coal bed in South Side mine.

Section.....	A	B	C
Laboratory No.....	{ 15127 15133	15128 15132	15129 15131
Roof, blue shale.....	<i>Ft. in.</i> 5 6	<i>Ft. in.</i> 5 7	<i>Ft. in.</i> 5 1
Coal.....	a 0 8	a 0 4	a 0 5
Clay and bone.....	0 7	.. ..	0 7
Coal.....	a 0 4	.. ..	a 0 2
Bone.....	0 10	1 9	0 11
Floor, clay.....			
Thickness of bed.....	7 11	7 8	7 2
Thickness of coal sampled.....	6 11	7 4	6 7

a Not included in sample.

Section A (samples 15127 and 15133) was measured at the face of room 2, off north entry 1, 50 feet in from entry.

Section B (samples 15128 and 15132) was measured in the crosscut from the main entry to the back entry, 350 feet from the mouth of the main entry and 75 feet from the face of the back entry.

Section C (samples 15129 and 15131) was measured at the face of the first south back entry, 150 feet from the main slope.

A composite sample was made by mixing samples 15127, 15128, and 15129. The results of an ultimate analysis of this sample are given under laboratory No. 15130.

A composite sample was made by mixing samples 15131, 15132, and 15133. The results of an ultimate analysis of this sample are given under laboratory No. 15134.

Section of coal bed in North Side mine.

Laboratory No.	{ 15143
Roof, blue shale.	{ 15144
Coal.	<i>Ft. in.</i>
Clay and bone.	1 11
Coal.	0 1
Bone.	0 6
Coal.	0 1
Floor, clay.	2 11
Thickness of bed.	5 6
Thickness of coal sampled.	5 6

The above section (samples 15143 and 15144) was measured on the last pillar on the second west main entry, 500 feet from the drift mouth.

Notes.—At the time of sampling the North Side mine was almost worked out; advance work being completed. It was estimated that all the pillars would be withdrawn within one and one-half years. Twenty-seven inches or more of bottom coal had been left in the mine.

The South Side mine was a new mine on the opposite side of the gulch from the North Side mine. The coal was delivered to the North Side tipple over a wooden trestle 1,600 feet long, with a 4 per cent grade. At the time of sampling all the workings in the South Side mine were narrow. The coal was cut in the 4 to 8-inch parting with machines and the top coal mined three cuts ahead of the bottom coal. This was the first mine in the district to mine the bottom coal of the No. 3 bed; the lower bench averages 27 inches in thickness. The coal was broken down with FF black blasting powder. Dynamite was sometimes used for brushing the roof and floor.

The screening equipment consisted of shaking screens 16 feet long and 6 feet wide, in three sections: an 8-foot section with 2-inch openings, a 4-foot section with 4-inch openings, and a 4-foot section with 6-inch openings; a small shaking screen 14 feet long and 6 feet wide, in two sections: an 8-foot section with 1½-inch openings and a 6-foot section with 1½-inch openings; and a revolving screen 12 feet long with ¾-inch openings. Four per cent of the coal was shipped as run-of-mine. Sixty-five per cent of the coal going to the screens passed through the 6-inch openings. Pickers were employed on picking tables. The lumps were large and had a good appearance. There were three loading tracks with a capacity of 25 empty and 25 loaded cars. The daily output was 300 tons. There was about 600 acres of unmined coal tributary to the tipple.

CHOUTEAU COUNTY.

BIG SANDY. MACKTON MINE.

Sample.—Subbituminous coal; Big Sandy field; analyses Nos. 14613 and 14615 (p. 54).

Mine.—Mackton; NW. ¼ SW. ¼ sec. 18, T. 28 N., R. 14 E., 6 miles northeast of Big Sandy.

Coal bed.—Mackton. Tertiary age, Fort Union formation. Thickness about 7½ feet; dip 40° east.

The bed was measured and sampled at two points in the mine by C. F. Bowen and Harvey Bassler on August 12, 1912, as shown below:

Sections of coal bed in Mackton mine..

Section.....	A	B
Laboratory No.....	14613	14615
Roof, sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 5	1 5
Bone.....	a 0 2	a 0 2
Coal.....	0 6	1 3
Bone and coal.....	a 1 9	a 1 3
Coal.....	2 7	3 5
Floor, sandstone.....		
Thickness of bed.....	7 5	7 6
Thickness of coal sampled.....	5 6	6 1

a Not included in sample.

Section A (sample 14613) was measured at the face of the north entry on the second level, 335 feet below the mouth of the slope and 140 feet from the mouth of the entry.

Section B (sample 14615) was measured at the face of the south entry on the first level, 150 feet below the mouth of the slope and 250 feet south of the mouth of the entry.

Sample 14613 represents perfectly fresh coal. Sample 14615 represents coal on which no mining had been done for nearly a year and was probably somewhat weathered.

Notes.—The dip and thickness of the bed are fairly uniform in the mine. The output was about 100 tons a day during the winter months but was less in the summer season.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 128, 595.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 541, 1914. (In press.)

CUSTER COUNTY.

TERRY. CAMERON MINE.

Sample.—Lignite; Terry field; analysis No. 10677 (p. 54).

Mine.—Cameron, an open-pit mine in sec. 24, T. 12 N., R. 50 E., about 4 miles west of Terry, which is the nearest station on the Northern Pacific Railway and the Chicago, Milwaukee & St. Paul Railway. The mine is about one-fourth of a mile south of the railroads.

Lignite bed.—Unnamed. Tertiary age, Fort Union formation. Thickness, 7 feet 5 inches. Roof, soft white sandstone; floor, shale. The bed was measured and sampled at one point in the pit by F. A. Herald on July 15, 1910, as described below:

Section of lignite bed in Cameron mine.

Laboratory No.....	10677
Roof, soft sandstone.....	<i>Ft. in.</i>
Lignite.....	a 0 8
Parting.....	a 0 8
Lignite.....	a 3 4
Lignite.....	3 5
Floor, shale.....	
Thickness of bed.....	8 1
Thickness of coal sampled.....	3 5

a Not included in sample.

The 3 foot 4 inch bench above the part sampled was apparently as good lignite as the lower part of the bed, although it was reported at the mine that it burns quickly and does not give out as much heat. At the time of sampling the mine was worked as an open pit and the output was only one or two wagon loads a day.

For a description of the geologic relations of this lignite bed see U. S. Geol. Survey Bull. 471, 1912, p. 246.

WESTMORE. PROSPECT.

Sample.—Lignite; Baker field; analysis No. 10910 (p. 54).

Mine.—Prospect opening in sec. 34, T. 6 N., R. 57 E., about 17 miles south of Westmore, which is the nearest railroad station on the Chicago, Milwaukee & St. Paul Railway.

Lignite bed.—Unnamed. Tertiary age, Fort Union formation. Thickness, 4 feet 3 inches. Above the lignite is 2 inches of bituminous shale, overlain by a top clay. On account of the excessive amount of water in the opening the character of the floor could not be determined. The bed was sampled by C. F. Bowen on September 13, 1910. At the time this sample was taken the prospect was not being worked.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 471, 1912, p. 220.

DAWSON COUNTY.

GLENDIVE. PROSPECT.

Sample.—Lignite; Sidney field; analysis No. 10914 (p. 54).

Mine.—Prospect in SW $\frac{1}{4}$ sec. 31, T. 18 N., R. 57 E., 15 miles northeast of Glendive, which is the nearest station on the Northern Pacific Railway.

Lignite bed.—B. Tertiary age, Fort Union formation. Thickness, 5 feet. Roof, white clay; floor, grayish clay. The bed was sampled by Eugene Stebinger on July 25, 1910. The sample was taken on the right wall, 25 feet from the outcrop. The entry was caved and evidently had not been worked for some years.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 471, 1912, p. 297.

GLENDIVE. SNYDER MINE.

Sample.—Lignite; Glendive field; analysis No. 11045 (p. 54).

Mine.—Snyder, NW $\frac{1}{4}$ sec. 27, T. 17 N., R. 55 E., about 6 $\frac{1}{2}$ miles north of Glendive, which is the nearest station on the Northern Pacific Railway. The mine is about 6 miles from the railroad.

Lignite bed.—Second or middle bed, not named. Tertiary age, Fort Union formation. Thickness, about 8 feet. The bed was sampled at one point in the mine by J. H. Hance on October 4, 1910. The sample was taken at the working face, about 80 feet from the mine mouth.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 130, 610.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 471, 1912, p. 278.

FERGUS COUNTY.

HILGER. STONE MINE.

Sample.—Subbituminous coal, Lewistown field; analysis No. 14495 (p. 54).

Mine.—Stone; sec. 8, T. 19 N., R. 19 E., about 13 miles north of Hilger.

Coal bed.—Not named. Cretaceous age, Judith River formation. The bed was measured and sampled at one point in the mine by C. F. Bowen and Harvey Bassler on July 26, 1912, as shown below:

Section of coal bed in Stone mine.

Laboratory No.....	14495
Roof, shale.....	<i>Ft. in.</i>
Coal.....	2 0
Clay.....	a 0 7
Coal.....	0 8
Shale.....	a 0 4
Coal.....	0 6
Shale.....	a 0 2
Coal.....	0 9
Sandstone.....	a 0 2
Bone.....	a 0 5
Coal.....	0 5+
Floor, not stated.....	
Thickness of bed.....	6+ 0
Thickness of coal sampled.....	4 4

a Not included in sample.

The sample was taken at the face of the entry, 140 feet from the mine mouth and represents fresh coal.

Notes.—At the time of sampling the mine was not a regular producer. The coal was used chiefly as fuel for traction engines.

For a description of the geologic relations of this bed see U. S. Geol. Survey Bull. 541.

FLATHEAD COUNTY.**FLATHEAD RIVER. OUTCROP.**

Sample.—Subbituminous coal; Glacier Park field; analysis No. 12786 (p. 55).

Location.—Natural outcrop in bank of North Fork of Flathead River, in sec. 33, T. 34 N., R. 20 W.

Coal bed.—Not named. Tertiary age. The bed was measured and sampled below water level by M. R. Campbell on October 2, 1911, as follows:

Section of coal bed in outcrop in sec. 33, T. 34 N., R. 20 W.

Laboratory No.....	12786
Coal.....	<i>Ft. in.</i>
Clay.....	2 6
Coal.....	a 0 8
Clay.....	1 0
Coal.....	a 0 2
Clay.....	a 0 10
Coal.....	a 0 8
Coal.....	a 0 11
Thickness of bed.....	# 9
Thickness of coal sampled.....	3 6

a Not included in sample.

Notes.—The coal represented by the sample was weathered. At the time the sample was taken, no coal had been mined in this valley.

MISSOULA COUNTY.**MISSOULA. HELL GATE MINE.**

Sample.—Subbituminous coal; analyses Nos. 13541 and 13542.

Mine.—Hell Gate, a slope mine in sec. 4, T. 13 N., R. 19 W., 2 miles north of Missoula.

Coal bed.—Unnamed; in Tertiary lake beds, probably the White River formation of Oligocene age.

Sample 13541 was taken by J. T. Pardee on September 30, 1911, from coal in the bunker at the mouth of the mine and represented run-of-mine coal from a bed 6 feet thick in the east entry.

Sample 13542, as reported, was taken by H. L. Shapard in the east entry, 300 feet from the slope, and represented 6 feet 10 inches of coal.

Notes.—At the time the mine was visited the coal was used for local purposes. It slacks on exposure and will not stand storage nor transportation to any considerable distance.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 531, p. 241.

MUSSELSHELL COUNTY.

PAINTED ROCK. SHOLZ MINE.

Sample.—Subbituminous coal; analysis No. 15114 (p. 55).

Mine.—Sholz, a drift mine near the Great Northern Railway, NW. $\frac{1}{4}$ sec. 14, T. 5. N., R. 22 E., near Painted Rock.

Coal bed.—Unnamed. Cretaceous age; Judith River formation; lenticular, maximum thickness 44 inches.

The bed was measured and sampled at one place in the mine by E. G. Woodruff on September 10, 1912.

The mine consisted of two drifts, a north one 110 feet long, and a south one 80 feet long. The sample was taken from a working face at the end of the longer drift, and represents 2 feet 11 inches of coal. There was shale interlaminated with coal above the part sampled, and sandy shale below it.

ROSEBUD COUNTY.

BIGHORN. PROSPECT.

Sample.—Subbituminous coal; Tullock Creek field; analysis No. 14755 (p. 55).

Location.—Prospect in the NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 2, T. 4 N., R. 35 E., on Unknown Creek, $6\frac{1}{2}$ miles east of Bighorn. No railroad connection.

Coal bed.—Not named. Cretaceous or Tertiary age; Lance formation. Character, variable and lenticular.

The bed was measured and sampled by C. E. Leshner and G. S. Rogers on September 18, 1912.

Section of coal bed in prospect, $6\frac{1}{2}$ miles east of Bighorn.

Laboratory No.	14755
Roof, shale and thin sandstone.	<i>Ft. In.</i>
Coal.....	a0 1
Sandstone.....	a0 $\frac{1}{2}$
Shale.....	a0 $1\frac{1}{2}$
Coal.....	0 8
Bone.....	a0 $1\frac{1}{2}$
Coal.....	0 8
Coal, dirty.....	0 3
Coal, hard.....	1 2 $\frac{1}{2}$
Floor, shale.	
Thickness of bed.....	3 2 $\frac{1}{2}$
Thickness of coal sampled.....	2 9 $\frac{1}{2}$

a Not included in sample.

The sample was taken 10 feet from the surface at a freshly exposed face, but probably represented coal from the weathered part of the bed. No mining had been done at this prospect.

TETON COUNTY.

BROWNING. J. M. STONE PROSPECT.

Sample.—Bituminous coal; Blackfoot field; analysis No. 12602 (p. 55).

Mine.—J. M. Stone prospect, SE. $\frac{1}{4}$ sec. 35, T. 36 N., R. 12 W., on middle fork of Milk River, 22 miles northwest of Browning.

Coal bed.—The bed occurs at the top of a coarse gray sandstone formation of Upper Cretaceous age. Roof, clay-shale 2 feet thick, overlain by gray sandstone; floor, clay. Thickness, 2 feet 8 inches; dip, 40° northeast. The bed is in a folded and faulted belt of rocks. The coal is without a parting, and has a fine cubic grain, a graphite black color, and a jointed structure suggesting torsion due to folding. The bed was measured and sampled at one point in the mine by Eugene Stebinger on September 10, 1911.

Notes.—The sample was cut from the face of the entry, 50 feet in. The coal was probably slightly weathered. Mined only occasionally for domestic use.

CUT BANK. ALLISON PROSPECT.

Sample.—Bituminous coal; analysis No. 12494 (p. 55).

Mine.—Prospect of A. E. Allison, NE. $\frac{1}{4}$ sec. 29, T. 34 N., R. 6 W., on Cutbank Creek, 5 miles northwest of Cut Bank.

Coal bed.—An unnamed coal bed occurring 225 feet above the base of the Two Medicine formation, Upper Cretaceous age. Lies nearly flat, dipping only about 40 feet per mile westward. Roof and floor are both gray clay, the coal lays on a persistent massive gray sandstone bedrock 30 to 50 feet thick.

The coal is 1 foot 10 inches thick and is very dirty, containing occasional streaks of clean hard coal. The bed was measured and sampled by Eugene Stebinger on July 24, 1911.

Notes.—The sample represents partly weathered coal from the prospect entry, under 25 feet of cover. Attempts to sell this coal for local use were not successful.

CUT BANK. PROSPECT.

Sample.—Bituminous coal; analysis No. 14109 (p. 55).

Mine.—Prospect open cut; SW. $\frac{1}{4}$ sec. 26, T. 33 N., R. 6 W.; on bank of Spring Creek, 4 miles southwest of Cut Bank.

Coal bed.—An unnamed coal bed occurring 225 feet above the base of the Two Medicine formation, Upper Cretaceous age. Thickness, 11 inches. Bed lies almost flat, dipping only 40 feet to the mile to the west. The roof and floor are both of gray clay. The coal is clean, with well-marked joint planes. The bed was measured and sampled by Eugene Stebinger on June 13, 1912.

The sample was taken in a fresh open cut under 4 feet of cover, and represents partly weathered coal.

VALIER. BLAIR MINE.

Sample.—Bituminous coal; Valier field; analysis No. 12427 (p. 55).

Mine.—A. G. Blair, a drift mine in the NW. $\frac{1}{4}$ sec. 32, T. 31 N., R. 5 W., on Birch Creek, 8 miles northwest of Valier.

Coal bed.—The only workable bed occurring at the top of the Eagle sandstone, of Upper Cretaceous age. The bed lies nearly flat, dipping westward only 20 to 30 feet to the mile. Roof, dark gray clay-shale, containing a few lenses of massive gray sandstone lying directly on the coal; floor, clay. The bed was measured and sampled at one place in the mine by Eugene Stebinger on July 12, 1911, as described below.

Section of coal bed in Blair mine.

Laboratory No.	12427
Coal.	<i>Ft. in.</i>
Bone.	0 5
Coal.	a 0 2
Coal.	1 10
Thickness of bed.	2 5
Thickness of coal sampled.	2 3

^a Not included in sample.

Notes.—The sample was taken at the face of a new entry in 150 feet, in freshly mined coal. The upper 5 inches was hard coal with shiny black faces and showing some whitish dirt. The bone parting was persistent and regular. The lower bench, 1 foot 10 inches thick, was hard and fairly clean, with prominent joint planes, causing the coal to break in large blocks. At the time of sampling the mine was worked intermittently, employing up to 10 men, supplying a local trade in the vicinity of Valier and competing successfully with coal from the Great Falls field and Canadian coal from Lethbridge, Alta.

VALLEY COUNTY.**ANTELOPE. RICHARDSON MINE.**

Sample.—Lignite; Plentywood field; analysis No. 14614 (p. 55).

Mine.—Richardson; a drift mine in NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 21, T. 34 N., R. 55 E., 3 miles west of Antelope and 12 miles southeast of Plentywood.

Lignite bed.—Designated as "Richardson bed" by the United States Geological Survey. The bed lies about 800 feet above the base of the Fort Union formation of Tertiary age. Quality and thickness irregular. Dip, about 3 $\frac{1}{2}$ feet per thousand south-eastward.

The bed was measured and sampled at one point in the mine by C. M. Bauer, on August 12, 1912, as described below:

Section of lignite bed in Richardson mine.

Laboratory No.	14614
Roof, carbonaceous shale.	<i>Ft. in.</i>
Lignite.	3 1
Shale, blue.	a 0 5
Lignite.	5 2
Floor, brown shale.	
Thickness of bed.	8 8
Thickness of lignite sampled.	8 3

^a Not included in sample.

The sample was collected 200 feet north of the opening on the east side of the entry, under 75 feet of cover.

Notes.—The lignite of this mine is representative of lignite mined in this part of Montana.

For a description of the geologic relations of this lignite bed, see U. S. Geol. Survey Bull. 541.

BAINVILLE. RED BANK MINE.

Sample.—Lignite; Culbertson field; analysis No. 10898 (p. 55).

Mine.—Red Bank, an open-pit mine in sec. 10, T. 28 N., R. 59 E., 8 miles northeast of Bainville, which is the nearest station on the Great Northern Railway.

Lignite bed.—G, of the United States Geological Survey. Early Eocene age, Fort Union formation. Thickness, 5 feet 6 inches. The lignite is mined by stripping the

clay and soil from the surface. The bed was sampled at one place in the pit by A. L. Beekly on September 1, 1910. The upper 5 feet of the bed was comparatively dry; the lower 6 inches was wet. The sample, which represents the full thickness of the bed, was taken at the face.

For a description of the geologic relations of this lignite bed see U. S. Geol. Survey Bull. 471, 1912, p. 347.

CULBERTSON. BRUEGGER MINE.

Sample.—Lignite; Culbertson field; analysis No. 10724. (p. 56.)

Mine.—Bruegger; sec. 8, T. 28 N., R. 56 E.; 3 miles north of Culbertson, on the Great Northern Railway.

Lignite bed.—E bed of the United States Geological Survey. Tertiary age, Fort Union formation. Thickness, 7 feet. Roof, a gray clay shale; floor, blue clay.

The lignite bed was measured and sampled at one point in the mine by A. L. Beekly on July 26, 1910. The sample was taken about 75 feet north of the mine opening and represents 7 feet of lignite, the thickness of the bed. The lower 2½ feet was hard lignite, the next 2½ feet was somewhat slacked and broken, and the upper 2 feet was hard lignite. The roof was a shaly clay, and the floor blue clay.

Notes.—In 1910 the mine was worked only in the winter and the output was small.

For analyses and descriptions of other samples of lignite from this mine, see Bull. 22, Bureau of Mines, 1913, pp. 135, 630.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 471, 1912, p. 345.

CULBERTSON. BUTTERFIELD MINE.

Sample.—Lignite; Culbertson field; analysis No. 10727 (p. 56).

Mine.—Butterfield, in sec. 3, T. 27 N., R. 56 E., 3¼ miles southeast of Culbertson, which is the nearest station on the Great Northern Railway.

Lignite bed.—DD bed of the United States Geological Survey. Tertiary age, Fort Union formation. Thickness, 6 feet. Roof, sandy shale; floor, clay.

The bed was sampled by A. L. Beekly on July 18, 1910. The sample was taken about 150 feet from the mouth of the entry, the upper 18 inches being left to support the roof, and represents only the lower 4½ feet of the bed.

Notes.—The lignite is hard and of fair quality. The woody structure is so evident that it is often difficult to determine whether it is "wood" or coal. The lignite is tough and elastic and requires a strong blasting powder. At the time of sampling the mine was small and produced only 5 or 6 wagon loads a day during the winter season.

For a description of the geologic relations of this lignite bed see U. S. Geol. Survey Bull. 471, 1912, p. 340.

CULBERTSON. DEMPSEY MINE.

Sample.—Lignite; Culbertson field; analysis No. 10725 (p. 56).

Mine.—Dempsey, in sec. 34, T. 28 N., R. 56 E., 3 miles southeast of Culbertson, which is the nearest station on the Great Northern Railway.

Lignite bed.—E bed of the United States Geological Survey. Tertiary age, Fort Union formation. Thickness, 6 feet 6 inches. Roof, sandy clay; floor, shaly clay. The lignite is free from partings and consists of alternating hard and soft layers; part of the bed is brown.

The bed was sampled at one point in the mine by A. L. Beekly on July 21, 1910. Sample 10725 was taken at the face, about 60 feet northeast of the mouth.

Notes.—The mine was not being worked at the time the sample was taken.

For a description of the geologic relations of this lignite bed see U. S. Geol. Survey Bull. 471, 1912, p. 345.

CULBERTSON. PROSPECT.

Sample.—Lignite; Culbertson field; analysis No. 10726 (p. 56).

Mine.—Prospect, in sec. 34, T. 28 N., R. 56 E., 3 miles southeast of Culbertson, on the Northern Pacific Railway.

Lignite bed.—F bed of the United States Geological Survey. Tertiary age, Fort Union formation. Thickness, 7 feet. Roof, sandy shale; floor, blue clay. The lignite is soft brown.

The bed was sampled at one point in the mine by A. L. Beekly on July 21, 1910. The sample was taken in the entry, about 50 feet from the mouth of the entry, and represents 7 feet of lignite, the thickness of the bed.

Notes.—This prospect is about one-half mile from the Peck mine. It was not being worked at the time the sample was taken.

For a description of the geologic relations of this lignite bed see U. S. Geol. Survey Bull. 471, 1912, p. 345.

FROID. ASTROPE MINE.

Sample.—Lignite; Culbertson field; analysis No. 11005 (p. 56).

Mine.—The Astrope, a local mine in sec. 15, T. 29 N., R. 55 E., $5\frac{1}{2}$ miles southwest of Froid, which is the nearest station on the Bainville and Plentywood branch of the Great Northern Railway.

Lignite bed.—F of the United States Geological Survey, early Eocene age, Fort Union formation. Thickness, 6 feet. The upper 1 foot is soft, dirty lignite. The bed was sampled at one point in the mine by A. L. Beekly on September 14, 1910. The sample was taken in the mine 115 feet north of the mine mouth, and represents the lower 5 feet of the bed.

Notes.—At the time of sampling the output was 1 to 3 tons a day.

For a description of the geologic relations of this lignite bed see U. S. Geol. Survey Bull. 471, 1912, p. 348.

FROID. PROSPECT.

Sample.—Lignite; Culbertson field; analysis No. 11004 (p. 56).

Location.—A well in sec. 11, T. 29 N., R. 55 E., $3\frac{1}{2}$ miles southwest of Froid, which is the nearest station on the Bainville and Plentywood branch of the Great Northern Railway.

Lignite bed.—F of the United States Geological Survey, early Eocene age, Fort Union formation. Thickness, 7 feet, 10 inches. Roof, clay; floor, clay. There were no partings in the coal.

The bed was sampled in the well by A. L. Beekly on September 14, 1910. The well, which was 6 feet in diameter, penetrated the bed at a depth of 30 feet below the surface.

For a description of the geologic relations of this lignite bed see U. S. Geol. Survey Bull. 471, 1912, p. 348.

MEDICINE LAKE. BELGON MINE.

Sample.—Lignite; Culbertson field; analysis No. 10899 (p. 56).

Mine.—Belgon, an open-pit mine in sec. 4, T. 31 N., R. 59 E., 15 miles east of Medicine Lake, which is the nearest station on the Bainville and Plentywood branch of the Great Northern Railway.

Lignite bed.—No name. Early Eocene age, Fort Union formation. Thickness, 10 feet.

The bed was measured and sampled at one point in the pit by A. L. Beekly on September 6, 1910.

The sample was taken from the fresh working face where the bed was 10 feet thick, and represents 7 feet 6 inches of hard, tough lignite, with a woody grain. There was 1

foot 6 inches of soft, brownish-black lignite above the part sampled and 1 foot of wet, muddy lignite below it. The roof was shale.

For a description of the geologic relations of the lignite bed see U. S. Geol. Survey Bull. 471, 1912, p. 350.

MEDICINE LAKE. COAL RIDGE MINE.

Sample.—Lignite; Culbertson field; analysis No. 11002 (p. 56).

Mine.—Coal Ridge, a drift mine in sec. 8, T. 34 N., R. 58 E., about 22 miles northeast of Medicine Lake, which is the nearest station on the Bainville and Plentywood branch of the Great Northern Railway.

Lignite bed.—Known as the Coal Ridge, early Eocene age, Fort Union formation. Thickness, 10 to 16 feet. The bed becomes thinner toward the west.

The bed was measured and sampled at one point in the mine by A. L. Beekly on September 23, 1910.

The sample was taken at the face of the entry, about 400 feet from the mine mouth, where the bed was 10 feet thick. The sample represents 6 feet 6 inches of lignite. The upper 2 feet are left for roof, and the lower 1 foot 6 inches for floor.

Notes.—The outcrop lignite was badly slacked and contained thin streaks of shale. The lignite at the outcrop was 14 feet thick.

At the time of sampling the mine was small, producing only about 3 tons a day.

For a description of the geologic relations of this lignite bed see U. S. Geol. Survey Bull. 471, 1912, p. 352.

MEDICINE LAKE. JONES MINE.

Sample.—Lignite; Culbertson field; analysis No. 11006 (p. 56).

Mine.—Jones, in sec. 30, T. 33 N., R. 56 E., 6 miles northeast of Medicine Lake, which is the nearest station on the Bainville and Plentywood branch of the Great Northern Railway.

Lignite bed.—Locally known as Jones. Early Eocene age, Fort Union formation. Thickness, about 7 feet. Above the coal is a sandy clay; in mining, 1 foot 6 inches of coal is left for roof.

The bed was sampled at one point in the mine by A. L. Beekly on September 19, 1910. The sample was taken 250 feet south of the entry mouth and represents 5 feet 6 inches of lignite. At the time of sampling the output was 3 to 5 tons a day.

For a description of the geologic relations of this lignite bed see U. S. Geol. Survey Bull. 471, 1912, p. 351.

MEDICINE LAKE. TED YOUNG MINE.

Sample.—Lignite; Culbertson field; analysis No. 11003 (p. 56).

Mine.—Ted Young, a drift mine in sec. 6, T. 31 N., R. 56 E., 2½ miles southeast of Medicine Lake, which is the nearest station on the Bainville and Plentywood branch of the Great Northern Railway.

Lignite bed.—Locally known as Young. Early Eocene age, Fort Union formation. Thickness, 3 feet 6 inches. The bed was measured and sampled at one point in the mine by A. L. Beekly on September 17, 1910. The sample was taken about 300 feet southeast of the entry mouth and represents 3 feet 6 inches, the thickness of the bed, of hard, black, clean lignite.

For a description of the geologic relations of this lignite bed see U. S. Geol. Survey Bull. 471, 1912, p. 349.

MONDAK. OPEN PIT MINE.

Sample.—Lignite; Culbertson field; analysis No. 10900 (p. 57).

Mine.—Open pit in sec. 19, T. 27 N., R. 59 E., 7 miles northwest of Mondak, on the Great Northern Railway, and 1½ miles from the railway.

Lignite bed.—G of the United States Geological Survey. Early Eocene age, Fort Union formation. Thickness, 4 feet 6 inches. The lignite is brownish black. The clay overburden, 10 feet thick, is removed in mining.

The bed was sampled at one place in the pit by A. L. Beekly on August 23, 1910. The upper 2 feet of the coal is more or less weathered and soft, and the sample does not include this part of the bed.

For a description of the geologic relations of this lignite bed see U. S. Geol. Survey Bull. 471, 1912, p. 342.

PLENTYWOOD. PIERCE MINE.

Sample.—Lignite; Plentywood field; analysis No. 14670 (p. 57).

Mine.—Pierce; in SE. $\frac{1}{4}$ sec. 10, T. 35 N., R. 55 E., $2\frac{1}{2}$ miles northeast of Plentywood.

Lignite bed.—Designated as "Richardson bed" by the United States Geological Survey. The bed lies about 800 feet above the base of the Fort Union formation of Tertiary age. At the point of sampling it is overlain by about 30 feet of Fort Union cover and 30 feet of glacial drift. Quality and thickness, irregular. Dip, about 3 feet per thousand southeastward.

The bed was measured and sampled at one point in the mine by C. M. Bauer on August 20, 1912, as described below:

Section of lignite bed in Pierce mine.

		14670
Laboratory No.		
Roof, carbonaceous shale.		<i>Ft. in.</i>
Lignite.		0 3
Shale.		a 0 8
Lignite.		0 6
Shale.		a 0 3
Lignite, containing gypsum.		2 0
Clay.		a 0 7
Lignite.		3 9
Floor shale.		
Thickness of bed.		8 0
Thickness of lignite sampled.		6 6

a Excluded from sample.

The above section (sample 14670) was measured in the mine, 250 feet northwest of the opening.

Notes.—For a description of the geologic relations of this lignite bed see U. S. Geol. Survey Bull. 541.

NEVADA.

ESMERALDA COUNTY.

COALDALE. DARMS MINE.

Sample.—Bituminous coal; Coaldale field; analysis No. 13978 (p. 57).

Mine.—Darms, a slope mine in NE. $\frac{1}{4}$ sec. 33, T. 2 N., R. 37 E.; $3\frac{1}{2}$ miles southeast of Coaldale, on the Tonopah & Goldfield Railroad.

Coal bed.—C. Tertiary (Eocene or Miocene) age. Thickness, variable. Dip variable, being 60° NE. at the outcrop, 77° at 245 feet down the slope, and 10° at 280 feet. Strike, N. 53° W.

The bed was measured and sampled by J. H. Hance on March 7, 1912. Sample 13978 was taken in a drift off the slope, 300 feet from the mouth of the slope and 20 feet from the slope. The sample represents 7 feet of impure coal, the thickness of the bed.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 531, 1913, p. 321.

COALDALE. NEVADA MINE.

Sample.—Bituminous coal; Coaldale field; analyses Nos. 13979, 13980, and 14409 (p. 57).

Mine.—Nevada, a slope mine in S. $\frac{1}{2}$ of SE. $\frac{1}{4}$ sec. 29, T. 2 N., R. 37 E., $3\frac{1}{2}$ miles south-east of Coaldale, on the Tonopah & Goldfield Railroad.

Coal bed.—C. Tertiary (Eocene or Miocene) age; dip variable. The bed is cut off to the south by a fault.

The bed was measured and sampled at two points in the mine by J. H. Hance on March 8, 1912.

Notes.—Sample 13979 was taken at a point in the slope 150 feet from the mouth and represents 9 feet of impure coal, the entire thickness of the bed. Sample dry.

Sample 13980 was taken at a place in the mine 100 feet from the mouth and represents 8 feet of impure coal, the entire thickness of the bed.

Sample 14409 was taken from a block of coal representing a bench 12 inches thick in the mine. This block was sent by freight to Washington and the sample was cut by M. R. Campbell on July 17, 1912. The sample is supposed to represent the best coal in the bed.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 531, 1913, p. 320.

NEW MEXICO.

BERNALILLO COUNTY.

ALBUQUERQUE. HOLMES MINE.

Sample.—Bituminous coal; Tijeras field; analysis No. 12650 (p. 57).

Mine.—Holmes; a prospect drift entry in SW. $\frac{1}{4}$ sec. 6, T. 10 N., R. 6 E., about 25 miles east of Albuquerque.

Coal bed.—Not named. Cretaceous age; Mesaverde formation. Thickness, 6 inches to 2 feet 3 inches. There is shale above and below the coal. The coal is impure and badly crushed.

The bed was measured and sampled by W. T. Lee on July 17, 1911.

The sample was taken 300 feet from the mouth of the entry from a fresh face where the coal was 2 feet 3 inches thick. The same bed in other parts of the entry was only 6 inches thick. The differences were probably due to crushing.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 471, 1912, p. 576.

COLFAX COUNTY.

DAWSON. DAWSON No. 2 MINE.

Sample.—Bituminous (coking) coal; Raton field; analyses Nos. 12233, 12234, and 12235 (p. 57).

Mine.—Dawson No. 2, a drift mine in the Dawson district. The Dawson mines are in secs. 1, 2, 11, and 12, T. 29 N., and secs. 35 and 36, T. 28 N., R. 20 E., at Dawson, on the El Paso & Southwestern Railroad.

Coal bed.—"Raton." Cretaceous age, Vermejo formation. Average thickness, 6 feet; dip, 1° northwest; cleat, east and west. Roof, sandstone; floor, usually smooth clay and shale. Cover at points of sampling, 250 feet.

The bed was measured and sampled at two points in the mine by J. C. Roberts on May 17, 1911, as described below:

Sections of coal bed in Dawson No. 2 mine.

Section.....	A 12233	B 12234
Laboratory No.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, sandstone.....	a 1 6	.. ..
Coal, bony.....	2 4	0 6
Coal.....	0 2	0 5
Coal, bony.....	1 2	7 4
Coal.....	0 3	.. ..
Coal, bony.....	2 9½	.. ..
Coal.....	a 1 6	.. ..
Floor, bony coal and shale.....		
Thickness of bed.....	9 6	8 3
Thickness of coal sampled.....	6 6	8 3

a Not included in sample.

Section A (sample 12233) was measured at the face of the fifth north, 6,700 feet north-east of the "high line" entrance and represents a full face sample.

Section B (sample 12234) was measured at the face of the thirteenth east, 6,500 feet from the "high line" entrance.

Notes.—There are 5 mines at Dawson. At the time of sampling the mines had the following capacities: No. 1, 1,500 tons a day; No. 2, 2,000; No. 4, 1,400; and No. 5, 2,000 tons. The room-and-pillar method of mining is employed. The coal was shot down with "forty per cent" dynamite. None of the coal was shipped as run-of-mine. About 2,000 tons a day was sent to the screens and about 40 per cent passed through a shaking screen with 2-inch and 4-inch openings; pickers were employed. The screenings were coked; the coke ovens had a daily capacity of 1,600 tons. There were 5 loading tracks with a capacity of 200 empty and 200 loaded cars.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 137, 640.

GARDINER. GARDINER No. 1 MINE.

Sample.—Bituminous coal; Raton field; analysis No. 14795 (p. 57).

Mine.—Gardiner No. 1, a (new) drift mine in the Blossburg district, at Gardiner, one-half mile southeast of Blossburg.

Coal bed.—Raton. Cretaceous age, Vermejo formation. The bed is regular in thickness, but its value is diminished in some places by crushing and other movements of the inclosing rocks. Roof, shale; floor, shale.

The bed was measured and sampled at one point in the mine by W. T. Lee on September 27, 1912, as described below:

Section of coal bed in Gardiner No. 1 mine.

Laboratory No.....	14795
Roof, shale.....	<i>Ft. in.</i>
Coal, bony.....	a 0 7
Coal.....	5 5
Floor, shale.....	
Thickness of bed.....	6 0
Thickness of coal sampled.....	5 5

a Not included in sample.

Notes.—The sample was collected from a fresh face in room 6 off first west entry off the main entry, 400 feet from the outcrop. At the time of sampling the mine was doing development work and was shipping only 100 tons a day.

KOEHLER. KOEHLER No. 1 MINE.

Sample.—Bituminous (coking) coal; Raton field; analyses Nos. 12335, 12336, 12337, and 14796 (p. 58).

Mine.—Koehler No. 1, a drift mine in the Koehler district, T. 29 N., R. 22 E., at Koehler, on the St. Louis, Rocky Mountain & Pacific Railway.

Coal bed.—Raton. Cretaceous age, Vermejo formation. Average thickness, 9 feet, regular; dip 1° west. The roof is shale, bony coal, or sandstone, according to the locality. In most places where conglomeratic sandstone rests on the coal the bed has been partly eroded and is too thin to be mined. Floor, shale; cover, 450 to 500 feet.

The bed was measured and sampled at three points in the mine by J. C. Roberts on May 28, 1911, and at one point by W. T. Lee on September 27, 1912, as described below:

Sections of coal bed in Koehler No. 1 mine.

Section.....	A 12335	B 12336	C 12337	D 14796
Laboratory No.....				
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bony.....	a 2 0	a 2 0	.. ..	a 2 0
Coal.....	6 0	6 2	5 9	6 3
Coal (poor).....	a 1 0	.. ..	.. ..	.. ..
Floor, shale.....				
Thickness of bed.....	9 0	8 2	5 9	8 3
Thickness of coal sampled.....	6 0	6 2	5 9	6 3

a Not included in sample.

Section A (sample 12335) was measured as the face of room 20, off seventh east entry, 4,500 feet southeast of the mouth of the main entry.

Section B (sample 12336) was measured at the face of eighth west entry, 4,300 feet southeast of the mouth of the main entry.

Section C (sample 12337) was measured in room 20, off seventh east entry, 4,200 feet southeast of the mouth of the main entry.

Section D (sample 14796) was measured at the face of ninth west entry, 4,900 feet southwest of the main opening in Prairie Crow Canyon.

Notes.—There are three mines at Koehler. The room-and-pillar method of mining is employed. At the time of sampling the mines had the following capacity: No. 1, 1,000 tons a day; No. 2, 1,400 tons; and No. 3, 400 tons. From 300 to 350 men were employed. There was enough coal to maintain the above output for many years. Ten per cent of the coal was shipped as run-of-mine. The washer had a capacity of 1,200 tons a day, the coke ovens 700 tons, and the storage bins 800 tons. There were four loading tracks with a capacity of 60 empty and 80 loaded cars.

SUGARITE. SUGARITE No. 1 AND No. 2 MINES.

Sample.—Bituminous coal; Raton field; analyses Nos. 14791 and 14792 (p. 58).

Mines.—Sugarite No. 1 in NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 9, T. 31 N., R. 24 E.; and Sugarite No. 2 in NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 3, T. 31 N., R. 24 E. (private survey); drift mines at Sugarite.

Coal bed.—Sugarite. Cretaceous or Tertiary age, Raton formation. Roof, shale, with thin seams of coal; floor, shale.

The bed was measured and sampled at one point in No. 1 mine by W. T. Lee on September 27, 1912, as described below.

Section of coal bed in Sugarite No. 1 mine.

Laboratory No.	14791
Roof, shale, with thin seams of coal.	<i>Ft. in.</i>
Coal.	a 0 4
Shale.	a 0 1½
Coal.	5 1
Floor, shale.	
Thickness of bed.	5 6½
Thickness of coal sampled.	5 1

a Not included in sample.

The above section (sample 14791) was measured in the entry, 1,500 feet southwest of the mine mouth.

The bed was measured and sampled at one point in No. 2 mine by W. T. Lee on September 27, 1912, as described below:

Section of coal bed in Sugarite No. 2 mine.

Laboratory No.	14792
Shale, with thin seams of coal.	<i>Ft. in.</i>
Coal.	a 0 6
Shale.	a 0 2
Coal.	3 5
Bone.	a 0 2
Coal.	1 4
Shale.	
Thickness of bed.	5 7
Thickness of coal sampled.	4 9

a Not included in sample.

The above section (sample 14792) was measured in the entry, 1,200 feet northeast of the mine mouth.

Notes.—At the time the samples were taken the mines were new, and all the coal produced was from the main entries.

YANKEE. YANKEE NO. 3 MINE.

Sample.—Bituminous (noncoking) coal; Raton field; analyses Nos. 13365, 13366, and 13367 (p. 58).

Mine.—Yankee No. 3, a slope mine at Yankee, on the Santa Fe, Raton & Eastern Railroad with connections to the Atchison, Topeka & Santa Fe Railway and the St. Louis, Rocky Mountain & Pacific Railway.

Coal bed.—Yankee. Cretaceous or Tertiary age, Raton formation. Average thickness, 5 feet 6 inches; dip, 4 per cent northwest; cleat, east and west. The roof is a soft black shale which is treacherous; above the shale is a sandstone cap rock. Floor, soft smooth fire clay. Particles of the roof did not become mixed with the coal in mining but particles of the floor did. Cover at points of sampling, 250 to 300 feet.

The bed was measured and sampled at two points in the mine by J. C. Roberts on February 8, 1912, as described below:

Sections of coal bed in Yankee No. 3 mine, near Yankee.

Section.	A	B
Laboratory No.	13365	13366
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.	0 5	0 5
Shale.	a 0 1½	a 0 4
Coal.	1 0	1 0
Shale.	a 0 1	a 0 1½
Coal.	0 7	0 7
Shale.	a 1 0	a 1 3
Coal.	2 7	2 7
Floor, shale.		
Thickness of bed.	5 9½	6 3½
Thickness of coal sampled.	4 7	4 7

a Not included in sample.

Section A (sample 13365) was measured at the face of room 2, off tenth west entry 10.

Section B (sample 13366) was measured at the face of fifth south entry.

A composite sample was made by mixing face samples 13365 and 13366. The results of an ultimate analysis of this sample are shown under laboratory No. 13367.

Notes.—At the time of sampling, the coal was undercut by hand; the cuttings were not loaded with the coal. Permissible explosives were used for breaking down the coal and for brushing the roof and floor. All the output was shipped as run-of-mine. The tippie was equipped with a bar screen 16 feet long and 3 feet wide with 3-inch openings between the bars; a shaking screen 10 feet long by 8 feet wide, with $\frac{3}{4}$ -inch, 2-inch, and 3-inch holes; and a revolving screen 16 feet long with $\frac{3}{4}$ -inch openings. Pickers were employed at the conveyor belt and on the car. The lumps were medium large and of good appearance. There were four loading tracks with a capacity of 35 empty and 35 loaded cars. The daily output of the mine was 200 tons; the intent was to increase it to 2,500 tons. The mine had a probable life of 10 years.

For analysis and description of another sample of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 139, 645.

LINCOLN COUNTY.

WHITE OAKS. OLD ABE MINE.

Sample.—Bituminous coal; White Oaks field; analysis No. 15053 (p. 59).

Mine.—Old Abe, a slope mine in NW. $\frac{1}{4}$ sec. 5, T. 7 S., R. 13 E., $2\frac{1}{2}$ miles southeast of White Oaks.

Coal bed.—Old Abe. Post-Laramie (?) age. Thickness, variable; dip, 20° west. The bed was measured and sampled at one point in the mine by C. H. Wegemann on November 3, 1912, as described below:

Section of coal bed in Old Abe mine.

Laboratory No.....	15053
Roof, sandstone.....	<i>Ft. in.</i>
Coal.....	0 2
Bone.....	0 1
Coal.....	1 $\frac{1}{2}$
Bone.....	0 $\frac{1}{2}$
Coal.....	0 10 $\frac{3}{4}$
Bone.....	0 $\frac{3}{4}$
Coal.....	0 $\frac{1}{2}$
Coal, poor.....	0 1
Coal.....	1 $\frac{1}{4}$
Floor, shale.....	
Thickness of bed.....	$\frac{1}{4}$ $\frac{1}{2}$
Thickness of coal sampled.....	$\frac{1}{4}$ $\frac{1}{2}$ $\frac{1}{4}$

The above section was measured in the main slope, 300 feet from the slope mouth. At the time of sampling a slope had been run on the dip of the bed (20° west) and side entries driven from it, the rooms being driven up the rise from the entries.

For analyses and descriptions of another sample of coal from this mine, see Bull. 22, Bureau of Mines, 1913, pp. 139, 646.

WHITE OAKS. WILD CAT MINE.

Sample.—Bituminous coal; White Oaks field; analysis No. 15054 (p. 59).

Mine.—Wild Cat, a slope mine in SW. $\frac{1}{4}$ sec. 32, T. 6 S., R. 13 E., 2 miles southeast of White Oaks.

Coal bed.—Not named. Post-Laramie (?) age. Thickness, variable; dip, 25° west. The bed was measured and sampled at one point in the mine by C. H. Wegemann, on November 3, 1912, as shown below:

Section of bed in Wild Cat mine.

Laboratory No.	15054
Roof, black shale.	<i>Ft. in.</i>
Bone.	a 0 3½
Coal.	0 8½
Bone.	0 1½
Coal.	0 11
Coal, bony.	0 1
Floor, black shale.	
Thickness of bed.	2 1
Thickness of coal sampled.	1 9½

a Not included in sample.

The above section (sample 15054) was measured near the foot of the main slope. At the time of sampling a slope about 240 feet in length had been run on the dip of the bed (25° west) and entries driven from it, the rooms being driven up the rise.

M'KINLEY COUNTY.**BLACKROCK. ZUNI INDIAN SCHOOL MINE.**

Sample.—Subbituminous coal; Durango-Gallup field; analysis No. 15032 (p. 59).

Mine.—Zuni Indian School, a drift mine in sec. 6, T. 11 N., R. 17 W., 10 miles northeast of Blackrock.

Coal bed.—Not named. Cretaceous age, in the Benton group, below the Mesaverde formation. The bed was measured and sampled at one point in the mine by D. E. Winchester, on October 11, 1912, as described below:

Section of coal bed in Zuni Indian School mine.

Laboratory No.	15032
Roof, shale.	<i>Ft. in.</i>
Bone.	a 0 2
Coal.	1 10
Bone.	a 0 2
Coal.	1 0
Floor, shale.	
Thickness of bed.	3 2
Thickness of coal sampled.	2 10

a Not included in sample.

Note.—The sample was taken in room 2, west of the main entry.

SANTA FE COUNTY.**MADRID. ANTHRACITE NO. 4 MINE.**

Sample.—Anthracite coal; Cerrillos field; analysis No. 14886 (p. 59).

Mine.—Anthracite No. 4, a slope mine at Madrid, on the Ortiz land grant.

Coal bed.—White Ash. Cretaceous age; Mesaverde formation. Thickness, relatively uniform; dip, about 15° east. The roof is shale in most places, in some places it is formed by an overlying sill of intrusive rock, which has locally metamorphosed the coal. The floor is shale.

The bed was measured and sampled at one point in the mine by W. T. Lee on October 10, 1912.

The sample was collected from a working face 1,500 feet southeast of the mouth of the main entry, at a point where the coal was 2 feet 9 inches thick.

Note.—The output at the time the sample was taken was 150 tons a day. The coal was used mainly for domestic purposes.

For a description of the geologic relations of this coal bed see U. S. Geological Survey Bull. 531, 1913, p. 286.

MADRID. BLACKSMITH MINE.

Sample.—Bituminous coal; Cerrillos field; analysis No. 14884 (p. 59).

Mine.—Blacksmith, a drift mine at Madrid, on the Ortiz land grant.

Coal bed.—Peacock (?). Cretaceous age; Mesaverde formation.

The bed was measured and sampled at one point in the mine by W. T. Lee on October 10, 1912, as described below:

Section of coal bed in Blacksmith mine.

Laboratory No.	14884
Roof, shale.	<i>Ft. in.</i>
Coal.	a 0 6
Shale.	a 2 2
Coal.	0 9
Shale.	a 0 3
Coal.	1 7
Floor, shale.	
Thickness of bed.	5 3
Thickness of coal sampled.	2 4

a Not included in sample.

Notes.—The sample was collected from a fresh face in the mine, 300 feet from the mouth of the mine. The coal at this point, as in general throughout the mine, is crushed by movements of the containing rocks.

For a description of the geologic relations of this coal bed see U. S. Geological Survey Bull. 531, 1913, p. 297.

MADRID. HOLEN MINE.

Sample.—Bituminous coal; Cerrillos field; analysis No. 14885 (p. 59).

Mine.—Holen, a slope mine at Madrid, on the Ortiz land grant.

Coal bed.—Cook & White. Cretaceous age; Mesaverde formation. The roof and floor are shale.

The bed was measured and sampled at one point in the mine by W. T. Lee on October 9, 1912, as described below:

Section of coal bed in Holen mine.

Laboratory No.	14885
Roof, shale.	<i>Ft. in.</i>
Bone.	a 0 2
Coal.	3 3
Floor, shale.	
Thickness of bed.	3 5
Thickness of coal sampled.	3 3

a Not included in sample.

The sample was taken from a working face 1,300 feet east of the mine mouth.

Notes.—The coal near the surface does not coke, but a few hundred feet from the surface it changes to a coking coal. At the time of sampling the output of the mine was 100 tons a day. The coal was used mainly for domestic fuel.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 531, 1913, p. 306.

MADRID. PEACOCK PROSPECT.

Sample.—Bituminous coal; Cerrillos field; analysis No. 14887 (p. 59).

Mine.—Peacock, a prospect slope entry at Madrid, on the Ortiz land grant.

Coal bed.—Peacock. Cretaceous age, Mesaverde formation. Both roof and floor are bony coal.

The bed was measured and sampled at one point in the mine by W. T. Lee on October 10, 1912.

The sample was taken in the entry 400 feet northeast of the mouth of the entry from a face freshly cleared for the purpose of sampling. The sample represents 2 feet 4 inches of coal. There was bony coal above and below the part sampled.

Notes.—The prospect was not being worked at the time of sampling.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 531, 1913, p. 297.

NORTH DAKOTA.

ADAMS COUNTY.

HAYNES. NIPPER & MONROE MINE.

Sample.—Lignite; Cannonball River field; analysis No. 14542 (p. 59).

Mine.—Nipper & Monroe, a drift mine in sec. 16, T. 129 N., R. 94 W., $3\frac{1}{2}$ miles northeast of Haynes.

Lignite bed.—Haynes. Tertiary (Eocene) age, Fort Union formation. Average thickness reported, 12 feet.

The bed was sampled at one point in the mine by E. R. Lloyd on July 30, 1912. The part sampled was 8 feet 3 inches thick. The top of the bed had been left for roof because the overlying shale was not strong.

The sample was collected 630 feet east of the mouth of the entry.

For a description of the geologic relations of this bed see U. S. Geol. Survey Bull. 541.

HAYNES. WILLIAM PINKHAM MINE.

Sample.—Lignite; Cannonball River field; analysis No. 14544 (p. 59).

Mine.—William Pinkham, in sec. 36, T. 130 N., R. 94 W., about 9 miles northwest of Haynes.

Lignite bed.—Haynes. Tertiary (Eocene) age, Fort Union formation. Thickness, about 12 feet.

The bed was sampled at one point in the mine by E. R. Lloyd on July 30, 1912. The part sampled was 8 feet 10 inches thick and uniform in quality. The top of the bed had been left for roof because the overlying shale was weak.

The sample was taken 225 feet south of the mouth of the mine.

For a description of the geologic relations of this bed see U. S. Geol. Survey Bull. 541.

BOWMAN COUNTY.

AMOR. DURKIN PROSPECT.

Sample.—Lignite; Bowman County field; analysis No. 14857 (p. 59).

Location.—Open pit, known as the Durkin prospect, 2 miles southeast of Amor post office in SW. $\frac{1}{4}$ sec. 34, T. 130 N., R. 103 W., and 12 miles southwest of Bowman.

Lignite bed.—This bed is included in the Ludlow lignitic member of the Lance formation, Cretaceous or Tertiary age, and is designated as the T Cross bed from its best exposure, being at the T Cross ranch on Bacon Creek in sec. 20, T. 133 N., R. 104 W., in Billings County, where it is 24 feet thick. Its average thickness in Bowman County is about 5 feet, ranging from 3 feet 2 inches to 10 feet. The bed lies nearly flat, dipping only slightly to the northeast.

The bed was measured and sampled July 31, 1912, by C. J. Hares, as shown below:

Section of lignite in outcrop 2 miles southeast of Amor.

Laboratory No.	14857
Roof, sandstone.	<i>Ft. in.</i>
Lignite, dirty and badly weathered.	<i>a</i> 3 7
Lignite, dirty.	<i>a</i> 0 7
Lignite, fair.	0 9
Lignite, good, but with considerable marcasite.	<i>a</i> 0 2
Lignite, excellent.	1 10½
Lignite, good, under water.	<i>a</i> 1 8
Floor, not stated.	
Thickness of bed.	8 7½
Thickness of lignite sampled.	2 7½

a Not included in sample.

Notes.—There was 1 foot 6 inches of soft sandstone, overlain by 5 feet of shale and soil, above the lignite. The lignite is mined by stripping. At the time the sample was collected no lignite had been removed for some time, a face was cleaned and a fairly fresh sample obtained. The lignite was used wholly for local purposes.

SCRANTON. SCRANTON MINE.

Sample.—Lignite; Bowman County field; analysis No. 14485 (p. 59).

Mine.—Scranton, a drift mine in SW. ¼ sec. 24, T. 131 N., R. 100 W., at Scranton, on the Chicago, Milwaukee & St. Paul Railroad.

Lignite bed.—Probably the Harmon bed of Smith and Leonard (see U. S. Geol. Survey Bull. 341, p. 24) and the same one as sampled on Sand Creek (see U. S. Geol. Survey Bull. 285, p. 324) where it is 31 feet thick. About 200 feet above the base of the Fort Union formation, Tertiary age. Thickness, 19 to 23 feet, average 20½ feet. The bed lies nearly flat. It is by far the most important, thickest, and most extensive bed in Bowman and Billings counties.

The bed was measured and sampled at one point in the mine on June 30, 1912, by E. G. Woodruff and C. J. Hares, as shown below:

Section of lignite bed in Scranton mine.

Laboratory No.	14485
Clay.	<i>Ft. in.</i>
Lignite.	<i>a</i> 5 0
Lignite, impure.	<i>a</i> 0 7
Lignite.	6 0
Shale, brown, carbonaceous.	<i>a</i> 0 1½
Lignite.	<i>a</i> 0 7
Lignite.	<i>a</i> 8 0
Thickness of bed.	20 3½
Thickness of lignite sampled.	6 0

a Not included in sample.

The sample was taken at the face of the main east entry, off the main entry, about 500 feet from the main entry and 1,000 feet from the mouth of the main entry. The upper 5 feet of the bed is left for roof and the lower 8 feet for floor.

Notes.—The lignite from this mine is tough and woody but readily slacks upon exposure to air and sunlight. For that reason the lignite will not withstand long shipment. At the time of sampling it was used at points along the Chicago, Milwaukee & St. Paul Railroad, in the brick yards at Scranton, and by farmers.

For results of briquetting tests of this lignite see Bull. 14, Bureau of Mines, 1912, pp. 31, 32.

For analyses and descriptions of other samples of lignite from this mine see Bull. 22, Bureau of Mines, 1913, pp. 142, 658.

MORTON COUNTY.

LEITH. JONES MINE.

Sample.—Lignite; Cannonball River field; analysis No. 14729 (p. 60).

Mine.—Jones, a shaft mine in sec. 12, T. 133 N., R. 88 W., $1\frac{1}{2}$ miles west of Leith. Cover, 42 feet.

Lignite bed.—Haynes (?). Cretaceous age. Fort Union formation. The bed is reported to be 8 feet 6 inches thick and to have a shale roof. Only 5 feet 6 inches of the bottom of the bed is being mined, the upper 3 feet being left for roof. The lignite is uniform in quality, from dull to bright luster, and contains thin partings of mineral charcoal. There is also a considerable amount of pyrite in nodules which are easily separable from the lignite.

The bed was sampled at one point in the mine by E. R. Lloyd and C. E. Leshner on September 7, 1912. The sample was taken about 75 feet southwest of the foot of the shaft.

For a description of the geologic relations of the lignite bed see U. S. Geol. Survey Bull. 541.

WARD COUNTY.

PLAZA. PROSPECT.

Sample.—Lignite; analysis No. 11294 (p. 60).

Mine.—Prospect, in sec. 17, T. 152 N., R. 92 W., 25 miles west of Plaza, on the Minneapolis, St. Paul & Sault Ste. Marie Railroad.

Lignite bed.—Known as No. 3. Tertiary age, Fort Union formation. Thickness, 4 feet 11 inches. Roof, shale 6 inches thick; floor, clay. The bed was measured and sampled by M. A. Pishel on October 27, 1910. The bed was 4 feet 11 inches thick. The sample represented the lower 3 feet 8 inches, the upper 1 foot 8 inches being dirty coal. There was shale above the coal and clay below it.

WILLIAMS COUNTY.

AVOCA. BRUEGGER MINE.

Sample.—Lignite; Williston field; analysis No. 12587 (p. 60).

Mine.—Bruegger; in the NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 3, T. 154 N., R. 100 W., one-third mile northeast of Avoca, on the Great Northern Railway.

Lignite bed.—C bed. Tertiary (early Eocene) age, Fort Union formation.

The bed was measured and sampled at one point in the mine by F. A. Herald on September 5, 1911, as described below:

Section of lignite bed in the Bruegger mine.

Laboratory No.	12587
Lignite.....	<i>Ft. in.</i>
Lignite.....	a 3 4
Clay.....	a 5 6
Lignite.....	a 0 4
Thickness of bed.....	1 10
Thickness of lignite sampled.....	11 0
	5 6

a Not included in sample.

Note.—The section was measured 50 feet west of the end of the main entry and 1,225 feet from the mine mouth. The sample was wet.

For a description of the geologic relations of this bed, see U. S. Geol. Survey Bull. 531, 1913, p. 122.

TRENTON. GELTZ MINE.

Sample.—Lignite; Williston field; analysis No. 12411 (p. 60).

Mine.—Geltz, in the NW. $\frac{1}{4}$ sec. 27, T. 154 N., R. 102 W., 6 miles northeast of Trenton, on the Great Northern Railway.

Lignite bed.—No name. Tertiary (early Eocene) age, Fort Union formation. The bed was measured and sampled by F. A. Herald on June 30, 1911, as described below:

Section of lignite bed in the Geltz mine.

Laboratory No.	12411
Roof, yellow clay and shale.	<i>Ft. in.</i>
Lignite, hard, clean.	3 4
Clay, gray.	a 0 5
Lignite.	1 9
Floor, not stated.	
Thickness of bed.	5 6
Thickness of lignite sampled.	5 1

a Not included in sample.

Notes.—The sample was collected at the end of the main entry, 150 feet from the mine mouth. The sample represents dry lignite. The mine was worked intermittently; the lignite was used for local purposes.

For a description of the geologic relations of this bed, see U. S. Geol. Survey Bull. 531, 1913, p. 128.

WILLISTON. POWELL MINE.

Sample.—Lignite; Williston field; analysis No. 12588 (p. 60).

Mine.—Powell, in NW. $\frac{1}{4}$ of SE. $\frac{1}{4}$ sec. 33, T. 154 N., R. 100 W., $3\frac{1}{2}$ miles southeast of Williston, on the Great Northern Railway.

Lignite bed.—C. Tertiary (early Eocene) age, Fort Union formation.

The bed was measured and sampled by F. A. Herald on September 6, 1911.

The sample represents the lower 6 feet 6 inches of the bed, which at this point was 10 feet thick.

Notes.—The sample was taken 50 feet north of the main entry and 900 feet northeast of the mine mouth. The lignite was dry. The daily output was 30 tons in the summer and 50 tons in the winter.

For a description of the geologic relations of this bed, see U. S. Geol. Survey Bull. 531, 1913, p. 122.

WILLISTON. U. S. RECLAMATION SERVICE MINE.

Sample.—Lignite; Williston field; analysis No. 12533 (p. 60).

Mine.—U. S. Reclamation Service; SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 7, T. 154 N., R. 100 W.; 3 miles northeast of Williston, on the Great Northern Railway.

Lignite bed.—B. Tertiary (early Eocene) age, Fort Union formation. Thickness, 10 feet to 10 feet 6 inches. The bed was measured and sampled by F. A. Herald on August 16, 1911, the sample representing the bottom 8 feet of the bed, which is here 10 feet 3 inches thick.

Notes.—The sample was taken from William Spangler's room, 50 feet north of the main entry and 1,225 feet east of the mine mouth, and represents dry lignite. In 1911 the mine was operated only during the irrigation season. The daily output averaged 90 tons.

For a description of the geologic relations of this bed, see U. S. Geol. Survey Bull. 531, 1913, p. 121.

OHIO.

JEFFERSON COUNTY.

AMSTERDAM. AMSTERDAM MINE.

Sample.—Bituminous coal; Ohio field; analyses Nos. 10533, 15388, 15389, and 15390 (p. 61).

Mine.—Amsterdam, a shaft mine in sec. 18, T. 11 N., R. 4 W., near Amsterdam, on the Lake Erie, Alliance & Wheeling Railroad.

Coal bed.—Lower Freeport (?). Carboniferous age, Allegheny formation. Thickness, excluding bony coal at top of bed, 4 to 4½ feet; fairly uniform. The bed is overlain by shale 12 feet thick; above the shale is another coal bed of variable thickness. The shale roof is very poor; most of the rooms fall in before being worked out. The floor is an underclay, which is taken up in the haulage ways.

The bed was measured and sampled at three points in the mine by D. D. Condit on December 27, 1912, as described below:

Sections of coal bed in Amsterdam mine.

Section.....	A	B	C
Laboratory No.	15388	15389	15390
Roof, shale or bony coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bony.....	a 1 3	a 1 2	a 1 2
Coal.....	1 11	1 7½	1 6½
Bone.....	a 0 2½	a 0 3½	a 0 3
Coal.....	1 10	1 8½	1 11
Coal, impure.....	a 0 5	a 0 5	a 0 5
Floor, shale.			
Thickness of bed	5 7½	5 2½	5 3½
Thickness of coal sampled.....	3 9	3 4	3 5½

a Not included in sample.

Section A (sample 15388) was measured in room 4, off entry 4, east section, 1,000 feet northeast of the shaft.

Section B (sample 15389) was measured in room 15, off west entry 9, section 2 north, 4,000 feet northwest of the shaft.

Section C (sample 15390) was measured in section 3 south, west entry 8, 4,500 feet southwest of the shaft.

The bed was measured and sampled at one point in the mine by J. W. Paul on May 3, 1910.

The sample (No. 10533) was taken at the center of the face of the face entry, where the bed was 5 feet 2 inches thick, and represented the lower 4 feet 1 inch, all clean coal. There was 13 inches of bony coal above the part sampled.

Notes.—The shaft is 270 feet deep to the top of the coal. The coal is mined by the room-and-pillar method. At the time of sampling the coal was undercut by electric cutting machines.

AMSTERDAM. EASTERN OHIO MINE.

Sample.—Bituminous coal; Ohio field; analyses Nos. 15391, 15392, and 15393 (p. 61).

Mine.—Eastern Ohio, a slope mine in NE. ¼ sec. 8, T. 12 N., R. 4 W., on the Lake Erie, Alliance & Wheeling Railroad, halfway between Amsterdam and Bergholz.

Coal bed.—Lower Freeport (?). Carboniferous age, Allegheny formation. Roof, dark sandy shale, fairly firm. A little below the middle of the bed is a thin, persistent layer of bony coal. The coal is hard and tough.

The bed was measured and sampled at three points in the mine by D. D. Condit on December 28, 1912, as described below:

Sections of coal bed in Eastern Ohio mine.

Section.....	A	B	C
Laboratory No.....	15391	15392	15393
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, impure.....	a 0 4	a 0 4	a 0 3
Coal.....	2 5	2 9	3 1
Bone.....	a 0 2	a 0 3	a 0 2½
Coal.....	2 3	2 0	1 10
Coal, impure.....	a 0 2	.. ..	.. ..
Floor, clay and shale.....	.. ..	.. ..	.. ..
Thickness of bed.....	5 4	5 4	5 4½
Thickness of coal sampled.....	4 8	4 9	4 11

a Not included in sample.

Section A (sample 15391) was measured in room 11, off west butt entry 12, 3,000 feet west of the mouth of the slope.

Section B (sample 15392) was measured at west entry 13, off the south face entry.

Section C (sample 15393) was measured in left butt entry 12, off the north face entry, 2,700 feet northeast of the mouth of the slope.

AMSTERDAM. ELIZABETH MINE.

Sample.—Bituminous coal; Ohio field; analyses numbers 15440, 15441, and 15443 (p. 61).

Mine.—Elizabeth, a shaft mine in SE. ¼ sec. 7, T. 12 N., R. 4 W., 2 miles east of Amsterdam, on a branch of the Lake Erie, Alliance & Wheeling Railroad.

Coal bed.—Probably the Lower Freeport. Carboniferous age, Allegheny formation. Roof, shale; floor, clay.

The bed was measured and sampled at three places in the mine by D. D. Condit on December 30, 1912, as described below:

Sections of coal bed in Elizabeth mine.

Section.....	A	B	C
Laboratory No.....	15440	15441	15443
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bony.....	.. ..	a 0 7	a 0 4½
Coal, impure.....	0 5	0 7	0 6
Bone.....	a 0 2	a 0 2½	a 0 1
Coal.....	1 9	1 9	1 7
Bone.....	a 0 3½	a 0 3	a 0 3½
Coal.....	1 7	1 9	1 9½
Coal, impure.....	a 0 3	a 0 4	.. ..
Floor, clay.....	.. ..	.. ..	.. ..
Thickness of bed.....	4 5½	5 5½	4 7½
Thickness of coal sampled.....	3 9	4 1	3 10½

a Not included in sample.

Section A (sample 15440) was measured in room 22, off west entry 3, 2,600 feet northwest of the shaft.

Section B (sample 15441) was measured in room 33, off the second south face entry, 2,400 feet west of the shaft.

Section C (sample 15443) was measured in room 6, off west entry 9, 2,600 feet northeast of the shaft.

Notes.—The coal is hard and tough and breaks with a conchoidal fracture. The impure bony coal at the top and the two bone layers in the body of the bed are persistent and vary considerably in thickness from place to place. Pyrite bands are plentiful. The shale roof requires little timbering. Most of the mine workings were unusually dry. The equipment of the mine was modern. The daily output of the mine (run-of-mine) was reported at about 1,000 tons at the time of sampling.

BRILLIANT. GOUCHER NO. 2 MINE.

Sample.—Bituminous coal; Ohio field; analyses Nos. 15563 and 15564 (p. 62).

Mine.—Goucher No. 2, a drift mine, in SE. $\frac{1}{4}$ sec. 6, T. 5 N., R. 2 W., 1 mile west of Brilliant, on Cleveland & Pittsburg division of the Pennsylvania Railroad.

Coal bed.—Pittsburgh or No. 8. Carboniferous age, Monongahela formation. Thickness fairly uniform; at this mine about 5 feet. The bed lies nearly flat.

The bed was measured and sampled at two points in the mine by D. D. Condit on January 4, 1913, as described below:

Sections of coal bed in Goucher No. 2 mine.

Section.....	A	B
Laboratory No.	15563	15564
Roof, clay ("soapstone").	<i>Ft. in.</i>	<i>Ft. in.</i>
Bone.....	.. ..	a 0 3
Coal.....	2 3	2 3
"Sulphur" band.....	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$
Coal.....	a 0 $\frac{3}{4}$	a 0 3
"Sulphur" band.....	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$
Coal.....	1 3	2 5
"Sulphur" band.....	0 $\frac{1}{8}$	.. ..
Coal.....	0 11	.. ..
Floor, clay and shale.	.. ..	.. ..
Thickness of bed.....	4 $9\frac{1}{8}$	5 $3\frac{1}{2}$
Thickness of coal sampled.....	4 $5\frac{1}{8}$	4 8

a Not included in sample.

Section A (sample 15563) was measured in face entry 2, north side of mine, 500 feet northwest of the mine mouth. Cover, about 100 feet.

Section B (sample 15564) was measured in room 1, right entry 1, south side, 500 feet northwest of the mine mouth and about 1,200 feet from point where sample 15563 was taken.

Notes.—The output (run-of-mine) was reported at the time of sampling to be 700 tons a day.

HOPEDALE. PARLETT MINE.

Sample.—Bituminous coal; Ohio field; analyses Nos. 15444 and 15445 (p. 62).

Mine.—Parlett, a slope mine in SE. $\frac{1}{4}$ sec. 32, T. 9 N., R. 3. W., 2 miles southeast of Hopedale, on the Wabash-Pittsburg Terminal Railway.

Coal bed.—Pittsburgh or No. 8 of Ohio Geological Survey. Carboniferous age, Monongahela formation. Average thickness, 4 feet 9 inches. The bed lies nearly flat. The roof is clay and the upper bench of coal characteristic of the Pittsburgh seam. The cover at most places is less than 100 feet.

The bed was measured and sampled at two points in the mine by D. D. Condit on December 31, 1912, as described below:

Sections of coal bed in Parlett mine.

Section.....	A	B
Laboratory No.	15444	15445
Roof, clay or coal.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, impure.....	.. ..	a 0 11
Clay.....	.. ..	a 0 3
Coal.....	.. ..	a 1 1
Clay.....	a 1 2	a 1 0
Coal.....	2 $5\frac{1}{2}$	2 2
Coal with several shale bands.....	a 0 $3\frac{1}{2}$	a 0 3
Coal.....	2 $\frac{1}{2}$	2 3
Floor, clay.	.. ..	.. ..
Thickness of bed.....	5 $11\frac{1}{2}$	7 11
Thickness of coal sampled.....	4 6	4 5

a Not included in sample.

Section A (sample 15444) was measured in room 9, off west entry 2, off south entry, 2,200 feet north of the bottom of the slope. Cover, about 30 feet.

Section B (sample 15445) was measured in north entry 2; 180 feet beyond rooms 9 and 10, off west entry, 400 feet northwest of the bottom of the slope. Cover, 28 feet.

Notes.—The mine is very wet. At the time of sampling the output was reported to be 150 tons a day.

PINEY FORK. PINEY FORK NO. 1 AND NO. 2 MINES, AND CABBAGE RUN MINE.

Sample.—Bituminous coal; Ohio field; analyses Nos. 15489, 15490, and 15491 (p. 62).

Mines.—Piney Fork No. 1 and No. 2 mines and Cabbage Run mine, secs. 21, 17, and 16, T. 8 N., R. 3 W., 2 miles southwest of Smithfield, on Lake Erie, Alliance & Wheeling Railroad.

Coal bed.—Pittsburgh or No. 8 of Ohio Geological Survey. Carboniferous age, Monongahela formation. Thickness fairly uniform, about $4\frac{1}{2}$ feet. The bed lies nearly flat. The roof of the main bed of coal is a clay band about 1 foot thick which is taken down in most places. Above this is the "roof" coal, an impure bony bed of variable thickness which has not been mined in this district.

The bed was measured and sampled at one point in No. 1 mine, at one point in No. 2 mine, and at one point in Cabbage Run mine by D. D. Condit on January 3, 1913, as described below:

Sections of coal bed in Piney Fork mines.

Section.....	A 15489	B 15490	C 15491
Laboratory No.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, coal or clay.....			
Bone.....	a 0 2	.. ..	.. ..
Coal.....	2 7	2 2 $\frac{1}{2}$	2 3 $\frac{1}{2}$
Clay.....	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$
Coal.....	a 0 3	a 0 3 $\frac{1}{2}$	a 0 3 $\frac{1}{2}$
Clay.....	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$
Coal.....	1 1	1 8	1 3
Clay band.....	0 $\frac{1}{2}$	.. ..	0 $\frac{1}{2}$
Coal.....	0 5	.. ..	0 6 $\frac{1}{2}$
Coal, high in sulphur.....	a 0 3	a 0 3	a 0 3
Floor, clay and shale.....			
Thickness of bed.....	4 9 $\frac{3}{4}$	4 5 $\frac{1}{2}$	4 8
Thickness of coal sampled.....	4 1 $\frac{1}{2}$	3 10 $\frac{1}{2}$	4 1 $\frac{1}{2}$

a Not included in sample.

Section A (sample 15489) was measured in mine No. 1, room 14, off left entry 11 off the main east entry, 4,000 feet southwest of the mine mouth. Cover, 125 feet.

Section B (sample 15490) was measured in mine No. 2, room 28, off east entry 21, 5,600 feet northeast of the mine mouth. Cover, 100 feet.

Section C (sample 15491) was measured in Cabbage Run mine, room 26 off left entry 3, 1,050 feet northeast of the mine mouth. Cover, 50 feet.

Notes.—At the time of sampling there were three drift mines in operation at Piney Fork, No. 1 and No. 2, and Cabbage Run mine. The daily output of screened coal from the three was reported to be about 1,250 tons. Sulphur bands and lenses were rather plentiful, but these were carefully sorted out of the coal.

SMITHFIELD. PLUM RUN NO. 1, NO. 4, AND NO. 5 MINES.

Sample.—Bituminous coal; Ohio field; analyses Nos. 15486, 15487, and 15488 (p. 63).

Mines.—Plum Run mines Nos. 1, 4, and 5, in SW. $\frac{1}{4}$ and NW. $\frac{1}{4}$ sec. 29 and sec. 30, T. 5 N., R. 2 W., 2 miles east of Smithfield, on branch of Lake Erie, Alliance & Wheeling Railroad.

Coal bed.—Pittsburgh or No. 8 of Ohio Geological Survey. Carboniferous age, Monongahela formation. Thickness, $4\frac{1}{2}$ to 5 feet. The bed lies nearly flat. The coal is overlain by a layer of clay 1 foot thick; above this clay is the "roof coal," which varies in thickness and was not mined. In the middle of the bed is a "bearing in".

layer, 3 to 4 inches thick, which was rejected in mining. The coal above this layer varies considerably in thickness from place to place. "Sulphur" in the form of small scattered lenses and bands was common.

The bed was measured and sampled at one point in No. 1, at one point in No. 4, and at one point in No. 5 mine by D. D. Condit on January 2, 1913, as described below:

Sections of coal bed in Plum Run mines.

Section.....	A	B	C
Laboratory No.....	15486	15487	15488
Roof, clay.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 3	1 10	2 1
"Sulphur" and clay.....	a 0	a 0	a 0 $\frac{1}{4}$
Coal.....	a 0 2 $\frac{1}{2}$	a 0 2 $\frac{3}{4}$	a 0 2 $\frac{1}{2}$
"Sulphur" and clay.....	a 0 $\frac{1}{4}$	a 0	a 0 $\frac{1}{4}$
Coal.....	2 3	2 3	2 2 $\frac{1}{2}$
Floor, clay and shale.....			
Thickness of bed.....	4 9	4 1 $\frac{1}{2}$	4 6 $\frac{1}{2}$
Thickness of coal sampled.....	4 6	4 1	4 3 $\frac{1}{2}$

a Not included in sample.

Section A (sample 15486) was measured in mine No. 1, room 7, off first south face entry, off seventh east entry, 2,500 feet northeast of the mine mouth. Cover, about 50 feet.

Section B (sample 15487) was measured in mine No. 4, room 14, off fifteenth right entry, 4,400 feet northeast of the mine mouth. Cover, 225 feet.

Section C (sample 15488) was measured in mine No. 5, room 3, off second right entry, off first right face entry, 1,800 feet southeast of the mine mouth. Cover, 200 feet.

Notes.—At the time of sampling there were four drift mines in operation here. The combined output of screened coal was reported at 1,350 tons a day.

STEUBENVILLE. LA BELLE MINE.

Sample.—Bituminous coal; Ohio field; analyses Nos. 15675 and 15676 (p. 63).

Mine.—La Belle, a shaft mine in SW $\frac{1}{4}$, sec. 29, T. 2 N., R. 1 W., on the banks of Ohio River in the city of Steubenville.

Coal bed.—Lower Freeport. Carboniferous age, Allegheny formation. The thickness varies greatly from place to place. The bed lies about 100 feet below river level.

The bed was measured and sampled at two points in the mine by D. D. Condit on January 9, 1913, as described below:

Sections of coal bed in La Belle mine.

Section.....	A	B
Laboratory No.....	15675	15676
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 9	1 9
Bone.....	0 $\frac{1}{4}$	0 1
Coal.....	0 9	0 8 $\frac{1}{2}$
Shale.....	a 0 1 $\frac{1}{2}$	a 0 3
Coal.....	0 6 $\frac{1}{2}$	0 7
Floor, clay, shale.....		
Thickness of bed.....	3 2	3 4 $\frac{1}{2}$
Thickness of coal sampled.....	3 $\frac{3}{4}$	3 1 $\frac{1}{2}$

a Not included in sample.

Section A (sample 15675) was measured in room 9, off left entry, off second south butt entry, 5,200 feet southeast of the shaft.

Section B (sample 15676) was measured in fifth south butt entry, off southeast entry, 4,400 feet southeast of the shaft.

Notes.—At the time of sampling nearly all the output was from West Virginia territory. The coal was used in iron and steel mills. The coal at the bottom of the bed is somewhat high in sulphur and for that reason was kept separate from the remainder of the bed and used only for steam purposes.

NOBLE COUNTY.

BELLE VALLEY. NOBLE MINE.

Sample.—Bituminous coal; Ohio field; analyses Nos. 17213, 17214, and 17215 (p. 63).

Mine.—Noble, a shaft mine 1 mile northwest of Belle Valley on the Marietta division of the Pennsylvania Railroad.

Coal bed.—Known as No. 7, Carboniferous age, Allegheny formation. Average thickness, about 4 feet 6 inches. Dip, northeast. Rock faults are of frequent occurrence. The roof is shale, roof coal, shale, and sandstone in the order mentioned. The floor is a hard smooth clay. Particles of the roof, but not of the floor, occasionally get mixed with the coal in loading. There are two other workable beds of coal at the Noble mine, one about 250 feet above and the other 100 feet below the No. 7 bed.

The bed was measured and sampled at two points in the mine by H. D. Mason, jr., and G. W. Salisbury on May 21, 1913, as described below.

Sections of coal bed in Noble mine.

Section.....	A	B
Laboratory No.....	17213	17214
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Top coal laminated with mother coal.....	0 6½	0 5
Coal.....	1 9	0 10½
Mother coal.....	.. ..	0 1
Coal.....	.. ..	1 3
Bony coal.....	.. ..	0 2½
"Sulphur".....	0 1	.. ..
Coal.....	0 8	1 6
"Slate" binder.....	a 0 3	a 0 2
Coal.....	0 10	0 10
Bottom coal.....	0 2	.. ..
Floor, underclay.....		
Thickness of bed.....	4 3½	5 4
Thickness of coal sampled.....	4 ½	5 2

a Not included in sample.

Section A (sample 17213) was measured at the face of eighth south entry (motor road), 5,700 feet southwest of the shaft bottom.

Section B (sample 17214) was measured at the face of room 5 off seventh south entry, 5,600 feet southwest of the shaft bottom.

A composite sample was made by mixing samples 17213 and 17214. The results of an ultimate analysis of this sample are given under laboratory No. 17215.

Note.—The shaft is 185 feet deep. The mine is worked by the room-and-pillar method. At the time of sampling the coal was shot down with FF black blasting powder. Dynamite was used for brushing the floor and roof. About 80 per cent of the coal was shipped as run-of-mine. About 33 per cent of the coal going to the screens passed through. The screens consisted of bars 72 feet long with 1¼ and ¾ inch openings. Pickers were employed on the cars in loading. There were three loading tracks with a capacity of 50 empty cars and 50 loaded cars. The average daily output was 600 tons, with a capacity of 1,500 tons. There was about 200 acres to be mined from this opening.

OKLAHOMA.

HASKELL COUNTY.

MCCURTAIN. SAN BOIS NO. 2 MINE.

Sample.—Bituminous (coking) coal; McAlester field; analyses Nos. 13688, 13689, 13690, 13691, 13692, and 13693 (p. 64).

Mine.—San Bois No. 2, a slope mine, 1 mile west of McCurtain, on the Fort Smith & Western Railway.

Coal bed.—McCurtain (Hartshorne) bed. Carboniferous (Allegheny) age, McAlester shale. Average thickness, 7 feet. Roof, shale of medium quality; floor, hard clay with smooth surface. Dip, 7° S. Cover at points of sampling, about 225 feet.

The bed was measured and sampled at five points in the mine by R. Y. Williams on March 30 and April 2, 1912, as described below:

Sections of coal bed in the San Bois No. 2 mine.

Section.....	A	B	C	D	E
Laboratory No.....	13688	13689	13690	13691	13692
Roof, dark gray limey shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, soft, bright, granular.....	2 2½	2 4	2 3½	2 6½	2 1
Bone.....	a 2 3	a 1 7½	a 1 4	a 3 2½	a 1 2
Coal, soft and bright.....	0 10½	1 7½	0 11½	1 4	0 6
"Sulphur" and bony coal.....	a 0 1½	0 3½	0 1½	a 0 ½	0 ½
Coal, soft and bright.....	1 1½	1 8½	2 2	2 2	2 8½
Coal, containing 3 bone streaks.....	0 1	..	..	..	..
Coal, soft and bright.....	1 6½	..	..	..	..
Floor, hard shale.....	..	..	..	..	..
Thickness of bed.....	8 5/8	7 3/8	6 10	8 11/8	6 6
Thickness of coal sampled.....	5 5/8	5 7/8	5 6	5 8½	5 4

a Not included in sample.

Section A (sample 13688) was measured at the face of thirteenth south entry, 5,000 feet west of the slope mouth.

Section B (sample 13689) was measured at the face of room 3, off thirteenth north entry, top side, 5,000 feet west of the slope mouth.

Section C (sample 13690) was measured at the face of eleventh south entry, 50 feet south of the slope and 5,000 feet west of the slope mouth.

Section D (sample 13691) was measured at the face of twelfth south entry in the top side, 5,500 feet west of the slope mouth.

Section E (sample 13692) was measured at the neck of room 6, twelfth north entry, top side, 5,300 feet west of the slope mouth.

Notes.—The mine is worked on the room-and-pillar system. At the time of sampling the coal was shot off the solid with dynamite. The lower bench was mined first, then the "dirt" was removed and the upper 3 feet of coal was blasted. The tipples were provided with bar screens and the entire output was screened. The screenings were washed and coked, there being 210 ovens at this plant. Pickers were employed on the cars. The average daily output was about 600 tons.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 149, 675.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 260, 1905, p. 382.

PITTSBURG COUNTY.

ADAMSON. ECLIPSE No. 1 MINE.

Sample.—Bituminous coal; McAlester field; analyses Nos. 16143, 16144, and 16145 (p. 64).

Mine.—Eclipse No. 1, a slope mine in sec. 9, T. 5 N., R. 17 E., 1½ miles east of Adamson, on the Missouri, Kansas & Texas Railway.

Coal bed.—Lower Hartshorne, Carboniferous (Allegheny) age, McAlester shale. Average thickness, 4 feet 6 inches. Dip, 38° northwest. Cleat, east and west. No faults, rolls, or horsebacks are encountered. The immediate roof is a "draw slate" 1 to 8 inches thick which comes down with the coal; above the "slate" is a gray shale. The floor is a hard smooth shale. Particles from both the floor and roof get mixed with the coal in mining. Cover at points of coupling, about 200 feet. The bed was measured and sampled at two points in the mine by W. T. Burgess on January 30, 1913.

Section A (sample 16143) was measured at the face of the third east entry, 600 feet northeast of the mouth of the slope. The sample represents 4 feet 6 inches of clean coal, the thickness of the bed.

Section B (sample 16144) was measured at the face of the third west entry, 600 feet northwest of the mouth of the slope. The sample represents 4 feet of clean coal, the thickness of the bed.

A composite sample was made by combining samples 16143 and 16144. The ultimate analysis of this sample is given under laboratory No. 16145.

Notes.—The mine is worked by the room-and-pillar system. At the time of sampling the coal was shot off the solid with black powder and "40 per cent" dynamite. These explosives were also used in brushing the floor and roof. The coal was all shipped as run-of-mine. Pickers were employed on the cars. The daily output was about 100 tons, all from advance workings. The mine had a probable life of about five years.

ALDERSON. ALDERSON No. 5 MINE.

Sample.—Bituminous coal; McAlester field; analyses Nos. 11915, 11916, 11917, and 11918 (p. 65).

Mine.—Alderson No. 5, a shaft mine in sec. 15, T. 5 N., R. 15 E., $1\frac{1}{2}$ miles southwest of Alderson, on the Chicago, Rock Island & Pacific Railway.

Coal bed.—McAlester. Carboniferous (Allegheny) age, McAlester shale. Average thickness, 3 feet 6 inches; dip, 9° southwest. Roof, smooth bluish-gray shale; floor, hard, rough fire clay. Cover, 320 to 625 feet. The bed was measured and sampled at four points in the mine by H. I. Smith on March 6, 1911, as described below:

Sections of coal bed in Alderson No. 5 mine.

Section.....	A	B	C	D
Laboratory No.....	11915	11916	11917	11918
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bony.....	.. ..	.. ..	a 0 4	.. ..
Shale and coal.....	.. ..	.. ..	a 0 6	.. ..
Coal, soft.....	.. ..	.. ..	0 6	0 7
Coal, uniform.....	3 7	3 5	2 0	3 0
Floor, clay.....				
Thickness of bed.....	3 7	3 5	3 4	3 7
Thickness of coal sampled.....	3 7	3 5	2 6	3 7

a Not included in sample.

Section A (sample 11915) was measured at the face of room 1, off the fourth west back entry, off the west slope, 2,200 feet west of the shaft.

Section B (sample 11916) was measured at the face of room 7, off seventh west entry, off the west slope, about 2,800 feet northwest of the shaft.

Section C (sample 11917) was measured at the face of room 66, off eleventh east entry, off the east slope, about 4,000 feet east of the shaft.

Section D (sample 11918) was measured at the face of second west entry, off the east slope, about 2,000 feet southeast of the shaft. This section contained a "sulphur" band one-eighth inch thick about 7 inches from the top.

Notes.—The mine is worked by the room-and-pillar system; the shaft is 555 feet deep. At the time of sampling the coal was undercut and was shot down with FF black powder and a permissible explosive. The coal was friable, about 75 per cent passing through a 4-inch screen. Pickers were employed on the cars in loading. The four loading tracks had a capacity of 25 empty cars and 100 loaded cars. The daily output was 400 tons, all from advance workings. The pillars were not robbed.

ALDERSON. ALDERSON No. 38 MINE.

Sample.—Bituminous coal; McAlester field; analyses Nos. 11592, 11594, 11670, 15188, and 15189 (p. 65).

Mine.—Alderson No. 38, a slope mine in T. 5 N., R. 15 E., 2 miles east of Alderson, on the Chicago, Rock Island & Pacific Railway.

Coal bed.—McAlester. Carboniferous (Allegheny) age, McAlester shale. Average thickness, 3 feet 5 inches; dip, 15° to 17° south. Roof, bluish-gray shale; floor, hard, brittle clay. Cover at points of sampling, 425 to 750 feet.

The bed was measured and sampled at three points in the mine by H. I. Smith on January 17 and 30, 1911, and at two points by C. S. Stevenson and W. T. Burgess on December 1, 1912.

Sample 11592 was taken in room 1, off seventh west entry, about 2,200 feet down the main slope. The sample represents 2 feet 9 inches of clear coal.

Sample 11594 was taken in room 4, off fifth east entry, about 2,300 feet down the main slope. The sample represents 3 feet 3 inches of clear coal.

Sample 11670 was taken in room 26, off fourth east entry, about 1,900 feet down the main slope. The sample represents 3 feet 2 inches of coal that contained a few thin seams (less than one-eighth inch thick) of bony coal.

Sample 15188 was taken at the face of sixth east entry, and represents 3 feet 6 inches of coal.

Sample 15189 was taken at the face of seventh west air course, and represents 3 feet 9 inches of coal.

Each sample represents the thickness of the bed at that point.

Notes.—The mine is worked by the room-and-pillar system. At the time of sampling the coal was shot from the solid with FF black powder. None of the coal was shipped as run-of-mine during 1910. About 33 per cent of the coal would pass through a 2½-inch screen. The coal was not washed. There were 5 loading tracks with a capacity of 14 empty and 14 loaded cars. The capacity was 200 tons a day.

CRAIG. BOLEN-DARNALL No. 4 MINE.

Sample.—Bituminous coal; McAlester field; analyses Nos. 15104 and 15105 (p. 65).

Mine.—Bolen-Darnall No. 4, a slope mine in Craig, on the Ardmore branch of the Chicago, Rock Island & Pacific Railway.

Coal bed.—Lower Hartshorne (?). Carboniferous (Allegheny) age, McAlester shale. Thickness, fairly uniform, average about 3 feet. Roof, bluish sandy shale, soft in places. Floor, hard rough clay, which becomes soft when exposed to the action of water. Cover at points of sampling, about 700 feet.

The bed was measured and sampled at two points in the mine by W. T. Burgess and C. S. Stevenson on November 12, 1912, as described below:

Sections of coal bed in Bolen-Darnall No. 4 mine.

Section.....	A	B
Laboratory No.....	15104	15105
Roof, gray shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 5½	3 ¼
"Sulphur" band.....	a 0 1	.. ..
Coal.....	1 4¾	.. ..
Floor, fire clay.....		
Thickness of bed.....	2 11½	3 ¼
Thickness of coal sampled.....	2 10½	3 ¼

a Not included in sample.

Section A (sample 15104) was measured at the face of eighth west entry, 3,000 feet northwest of the mouth of the slope.

Section B (sample 15105) was measured at the face of eighth east entry, 3,000 feet from the mouth of the slope.

Notes.—The mine is opened by a slope and is worked on the room-and-pillar system. The coal from this mine, like many others in this field, breaks easily into small pieces. In 1910 about 55 per cent of the coal passed through the screens. Only a small proportion was shipped as run-of-mine. The average daily output was about 150 tons.

McALESTER. BUSBY No. 5 MINE.

Samples.—Bituminous coal; McAlester field; analyses Nos. 11569, 11586, 11587, 11588, 11589, 11590, and 11591 (p. 65).

Mine.—Busby No. 5, a shaft mine in sec. 32, T. 6 N., R. 15 E., 2 miles east of McAlester on the Chicago, Rock Island & Pacific Railway and the Missouri, Kansas & Texas Railway.

Coal bed.—McAlester. Carboniferous (Allegheny) age, McAlester shale. Average thickness, 4 feet; dip, 10° S. 15° W.; cleat, S. 30° E. Roof, bluish-gray shale 30 feet thick; floor, hard fire clay. Cover at points of sampling, 550 to 720 feet.

The bed was measured and sampled at six places in the mine by H. I. Smith on January 11 and 19, 1911.

Sample 11569 was taken in room 11, off third west entry, off the east slope, about 1,600 feet from the shaft. The sample represents 4 feet 2 inches of clear coal, the thickness of the bed.

Sample 11586 was taken at the face of second west entry, off the west slope, 300 feet beyond room 26. The sample represents 4 feet of coal that contained a $\frac{1}{2}$ -inch band of "sulphur" about 4 inches from the top.

Sample 11587 was taken at the face of third east entry, off the east slope, 120 feet beyond room 22. The sample represents the thickness of the bed, 4 feet 2 inches; the upper three-fourths of an inch was bony coal.

Sample 11588 was taken at the face of fourth east entry, off the west slope. The bed was 4 feet thick and contained $\frac{1}{2}$ -inch band of "sulphur," 8 $\frac{1}{2}$ inches from the top. The top inch was bony coal. The sample represents the entire thickness of the bed.

Sample 11589 was taken at the face of fifth east entry, off the east slope, where the bed was 4 feet 3 inches thick. The sample represents 4 feet 1 $\frac{1}{2}$ inches of coal. There was 1 $\frac{1}{2}$ inches of bony coal above the part sampled.

Sample 11590 was taken at the face of third east entry, off the west slope, 200 feet beyond room 8. The sample represents the entire thickness of the bed. The bed was 4 feet thick, the top inch was bony coal, and there was a band of "sulphur" $\frac{1}{2}$ inch thick, 10 inches from the top.

A composite sample was made by mixing face samples 11586 to 11590. The results of an ultimate analysis of this sample are given under Laboratory No. 11591.

Notes.—The mine is worked by the room-and-pillar system. At the time of sampling the coal was shot from the solid with FF black powder. Only a small proportion of the coal was sold as run-of-mine. About 65 per cent of the coal going to the screens would pass through a 2-inch screen. Pickers were employed on the cars and at the shaking screens. There was no washery. The four loading tracks had a capacity of 20 empty and 20 loaded cars. The output was 600 tons a day; the unmined area tributary to this opening, 200 acres.

OREGON.

COOS COUNTY.

WEST FORK. FLANIGAN PROSPECT.

Sample.—Bituminous coal; Eden Ridge field; analysis No. 14828 (p. 66).

Mine.—Flanigan prospect, in NE. $\frac{1}{4}$ sec. 28, T. 32 S., R. 11 W., 36 miles southwest of West Fork (Dothan post office), on the Southern Pacific Railway.

Coal bed.—Anderson. Tertiary (Eocene) age, Arago formation.

The bed was measured and sampled by M. R. Campbell on September 24, 1912, as described below:

Section of coal bed in Flanigan prospect.

Laboratory No.....	14828
Roof, shale.....	<i>Ft. in.</i>
Coal.....	0 3 $\frac{1}{2}$
Bone.....	0 2
Coal.....	1 6
Coal, bony.....	0 5
Clay, white.....	a 0 2
Coal.....	0 8
Bone.....	a 0 2 $\frac{1}{2}$
Coal.....	0 6
Bone.....	0 3
Coal, soft, weathered (not mined).....	1 4
Floor, clay.....	
Thickness of bed.....	5 6
Thickness of coal sampled.....	5 1 $\frac{1}{2}$

a Not included in sample.

Notes.—The sample was taken in the entry, 125 feet from the mouth of the entry, and represents wet coal.

WEST FORK. HAMMOND PROSPECT.

Sample.—Bituminous coal; Eden Ridge field; analysis No. 14831 (p. 66).

Mine.—Hammond prospect, in SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 29, T. 32 S., R. 11 W., 37 miles southwest of West Fork (Dothan post office), on the Southern Pacific Railway.

Coal bed.—Carter. Tertiary (Eocene) age, Arago formation.

The bed was measured and sampled at one point in the mine by M. R. Campbell on September 26, 1912, as described below:

Section of coal bed in Hammond prospect.

Laboratory No.	14831
Roof, shale and coal.	<i>Ft. in.</i>
Coal.	0 10 $\frac{1}{2}$
Bone and coal.	a 0 8
Coal.	0 7
Bone and coal.	a 0 11
Coal.	1 1
Bone.	a 0 2
Coal.	1 8 $\frac{1}{2}$
Floor, clay.	
Thickness of bed.	6 0
Thickness of coal sampled.	4 3

a Not included in sample.

Notes.—The sample was collected in the entry, 100 feet from the drift mouth, and represents dry coal.

WEST FORK. HILLIS PROSPECT.

Sample.—Bituminous coal; Eden Ridge field; analysis No. 14827 and 14830 (p. 66).

Mine.—Hillis prospect, in SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 32, T. 32 S., R. 11 W., 36 miles southwest of West Fork (Dothan post office), on the Southern Pacific Railway.

Coal bed.—Anderson. Tertiary (Eocene) age, Arago formation.

The bed was measured and sampled at two points in the prospect by M. R. Campbell on September 24, 1912, as described below:

Sections of coal bed in Hillis prospect.

Laboratory No.	14827	14830
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.	a 0 1 $\frac{1}{2}$	0 1 $\frac{1}{2}$
Bone.	a 0 $\frac{1}{4}$	0 $\frac{1}{4}$
Coal.	a 0 4 $\frac{3}{4}$	0 4 $\frac{3}{4}$
Bone.	a 0 $\frac{1}{4}$	0 $\frac{1}{4}$
Coal.	a 2 2 $\frac{3}{4}$	2 2 $\frac{3}{4}$
Clay, white.	a 0 3	a 0 3
Coal.	a 0 2	a 0 2
Bone and bony coal.	a 1 5	a 1 5
Coal.	1 3 $\frac{1}{2}$	a 1 3 $\frac{1}{2}$
Coal, soft.	a 0 3	a 0 3
Bone.	a 0 8	a 0 8
Floor, clay.		
Thickness of bed.	6 10	6 10
Thickness of coal sampled.	1 3 $\frac{1}{2}$	2 9 $\frac{1}{2}$

a Not included in sample.

Notes.—Both samples were taken in the entry, 90 feet from the mouth. Sample 14827 represents wet coal and sample 14830 represents dry coal.

WEST FORK. VANDERPOOL PROSPECT.

Sample.—Bituminous coal; Eden Ridge field; analysis No. 14829 (p. 67).

Mine.—Vanderpool prospect, in NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 30, T. 32 S., R. 11 W., 38 miles southwest of West Fork (Dothan post office), on the Southern Pacific Railway.

Coal bed.—Anderson. Tertiary (Eocene) age, Arago formation.

The bed was measured and sampled at one point in the mine by M. R. Campbell on September 27, 1912, as described below:

Section of coal bed in Vanderpool prospect.

Laboratory No.....	14829
Roof, shale.....	<i>Fl. in.</i>
Coal.....	a 0 3
Bone.....	a 0 7
Coal.....	0 2
Bone.....	0 1
Coal, good.....	1 7
Bone.....	a 0 3
Clay, white.....	a 0 5
Coal, hard.....	a 0 9
Coal, soft, laminated.....	a 1 9½
Floor, clay.....	
Thickness of bed.....	5 10½
Thickness of coal sampled.....	1 10

a Not included in sample.

Notes.—The sample was taken in the entry, 217 feet from the mouth of the entry, and represents dry coal.

MALHEUR COUNTY.

NYSSA. HONOLULU PROSPECT.

Sample.—Lignite; analysis No. 12585 (p. 67).

Mine.—Honolulu prospect, in NE. ¼ sec. 2, T. 22 S., R. 44 E. (unsurveyed), about 25 miles southwest of Nyssa, on the Oregon Short Line Railroad.

Lignite bed.—Not named. Tertiary (Miocene?) age, Payette formation. Thickness, 2 feet 4 inches; variable. Dip, about 6° SW.; strike, N. 37° W. The bed is irregular in character. Roof, shale; floor, clay. At an opening about 1,000 feet north of the point of sampling the bed is cut by a sill of basalt and in places is metamorphosed to high-grade coal, which occurs in small lenses.

The bed was measured and sampled at one point in the mine by C. F. Bowen on July 24, 1911, as shown below:

Section of lignite bed at Honolulu prospect.

Laboratory No.....	12585
Roof, shale.....	<i>Fl. in.</i>
Lignite, fair.....	0 8
Lignite, bony.....	a 1 8
Floor, clay, sandy.....	
Thickness of bed.....	2 4
Thickness of lignite sampled.....	0 8

a Not included in sample.

The sample was taken at the mouth of the slope; the lignite was more or less weathered.

PENNSYLVANIA.

ALLEGHENY COUNTY.

BRUCETON. EXPERIMENTAL MINE.

Sample.—Bituminous coal; Pittsburgh field; analyses Nos. 11983, 11984, 11985, 11986, 12251, 12262, 12264, 12274, 12557, 12569, 12572, 12577, 14797, and 14798 (p. 67).

Mine.—The Experimental mine of the United States Bureau of Mines is a drift opening in the Pittsburgh district, about 1 mile south of Bruceton, near the Baltimore & Ohio Railroad siding at Wallace Station.

Coal bed.—Pittsburgh. Carboniferous age, Monongahela formation. Average thickness at mine, about 5 feet 3 inches. The roof is a "draw slate" 10 to 12 inches thick, above which there are thin strata of coal and shale, overlain by shale. The coal above the "draw slate" adheres to the roof shale. The floor is a fire clay. The bed is practically horizontal and the cover at the points where the samples were taken is 15 to 140 feet thick.

The bed was measured and sampled at three points in the mine by L. M. Jones on April 4, 1911, and at nine points by H. I. Smith between May, 1911, and October, 1912, as described below:

Sections of coal bed at Experimental mine.

[SECTIONS A TO F.]

Section.....	A	B	C	D	E	F
Laboratory No.....	11983	11984	11985	12251	12262	12264
Roof, "draw slate".....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 8	3 1 $\frac{1}{4}$	2 3	3 3	2 8	2 7
Shale.....	0	a 0	..	..	..	a 0 $\frac{1}{2}$
Soft dirt and "sulphur".....	0	0 2 $\frac{3}{4}$	..	..	..	..
Coal.....	0	0	..	a 0 $\frac{1}{2}$	..	..
Fire clay.....	0	..	0	..	Streak.	..
Soft dirt and "sulphur".....	0	..	0	..	..	..
Coal.....	1 5 $\frac{1}{4}$	..	0 6 $\frac{1}{8}$	0 3	0 6 $\frac{1}{2}$	0 3
Shale.....	0	a 0 1	a 0	a 0	a 0	a 0 $\frac{1}{2}$
Coal.....	0 3 $\frac{1}{2}$	1 1 $\frac{1}{2}$	0 2 $\frac{1}{2}$	0 5 $\frac{1}{2}$	0 3	0 3 $\frac{3}{4}$
Shale.....	a 0	..	a 0 1 $\frac{1}{2}$	..	a 0 $\frac{3}{4}$	a 0
Coal.....	..	..	0 3 $\frac{1}{2}$	..	..	0 3
"Sulphur" band.....	..	a 0	a 0	..	..	a 0
Coal.....	2 2	0 9 $\frac{1}{4}$	1 9	1 11	2 5	1 10 $\frac{1}{2}$
Dirty coal and shale.....	a 0 2 $\frac{1}{2}$	a 0 3	..	..	..	..
Floor, fire clay.....	..	..	..	..	..	..
Thickness of bed.....	5 11	5 7 $\frac{7}{8}$	5 3	5 11 $\frac{1}{2}$	6 0	5 5
Thickness of coal sampled.....	5 7 $\frac{1}{2}$	5 3	5 $\frac{3}{4}$	5 10 $\frac{1}{2}$	5 10 $\frac{1}{2}$	5 2 $\frac{1}{2}$

a Not included in sample.

[SECTIONS G TO L.]

Section.....	G	H	I	J	K	L
Laboratory No.....	12557	12569	12572	12577	14797	14798
Roof, "draw slate".....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 5	1 4 $\frac{1}{2}$	1 10 $\frac{1}{2}$	1 3	0 8 $\frac{1}{2}$	0 4 $\frac{1}{2}$
"Sulphur" or bone.....	0	0	0	0 $\frac{1}{2}$	a 0 1 $\frac{1}{4}$	0
Coal.....	1 5 $\frac{1}{2}$	1 6	0 1	0 2 $\frac{1}{2}$	0 7 $\frac{1}{2}$	0 5 $\frac{1}{2}$
"Sulphur" and shale.....	..	..	0 $\frac{1}{2}$	Streak.	a 0	a 0
Coal.....	..	..	0 10 $\frac{1}{2}$	0 7 $\frac{1}{2}$	0 11	1 5
"Sulphur".....	..	..	..	Streak.	0	Streak.
Coal.....	..	..	..	0 8	0 10	0 8
Shale binder.....	0 $\frac{1}{4}$	a 0 $\frac{1}{2}$	Streak.	0 $\frac{1}{2}$	a 0 $\frac{3}{4}$	Streak.
Coal.....	0 3	0 2 $\frac{1}{2}$	0 2 $\frac{3}{4}$	0 3	..	0 3 $\frac{1}{4}$
Shale binder.....	..	a 0 $\frac{1}{2}$	a 0 1	..	..	a 0 1
Bone.....	0 1	..	..	0 1	..	..
Coal.....	0 3	..	0 1	0 1	0 10 $\frac{1}{2}$	0 3
"Sulphur" balls.....	0 1	..	0 1 $\frac{1}{2}$	0 1	..	0 1 $\frac{1}{2}$
Coal.....	1 4 $\frac{1}{2}$	0 11	0 7 $\frac{1}{2}$	0 10	..	..
Mother coal.....	0 $\frac{1}{2}$	0 $\frac{1}{2}$	..	0 $\frac{1}{2}$	0 $\frac{1}{2}$	..
Coal.....	0 1	..	..	0 2 $\frac{1}{2}$	1 3 $\frac{1}{4}$	1 8
Bony coal.....	0 $\frac{1}{2}$	..	0 $\frac{1}{2}$	Streak.	..	..
Coal.....	0 2	0 8 $\frac{1}{2}$	0 10	0 8	..	..
Dirty coal.....	..	a 0 4	a 0 3	a 0 2	..	a 0 3
Floor, underclay.....	..	..	..	..	..	..
Thickness of bed.....	5 4	5 2 $\frac{1}{4}$	5 2	5 2 $\frac{3}{4}$	5 5 $\frac{1}{2}$	5 7 $\frac{1}{2}$
Thickness of coal sampled.....	5 4	4 9 $\frac{1}{2}$	4 10	5 $\frac{3}{4}$	5 3	5 2 $\frac{3}{4}$

a Not included in sample.

Section A (sample 11983) was measured on the rib of the first crosscut, about 200 feet from the mouth of the air course.

Section B (sample 11984) was measured on the rib near the face of the air course, 390 feet from the mouth of the air course.

Section C (sample 11985) was measured at the face of the main entry, 345 feet from the mouth of the main entry.

A composite sample was made by mixing samples 11983, 11984, and 11985. The results of an analysis of this sample are shown under laboratory No. 11986.

Section D (sample 12251) was measured in the air course, about 75 feet from the outcrop at the mouth of the air course.

Section E (sample 12262) was measured on the left side of the air course, about 150 feet from the mouth of the air course.

Section F (sample 12264) was measured on the left side of the air course, about 430 feet from the outcrop at the mouth of the air course.

Section G (sample 12557) was measured on the right side of the main entry, 680 feet in by the outcrop.

Section H (sample 12569) was measured on the right side of the main entry, 530 feet in by the outcrop.

Section I (sample 12572) was measured on the right side of the main entry, 580 feet in by the outcrop.

Section J (sample 12577) was measured on the right side of the main entry, 630 feet in by the outcrop.

Section K (sample 14797) was measured in the crosscut off the main entry, at station E-1250, 3 feet from the main entry.

Section L (sample 14798) was measured in the main entry at station E-1270.

Notes.—The Experimental mine is opened by parallel air course and entry, which at the time the last samples were taken, were in about 1,270 feet. The mine is used for experiments made in connection with investigations of the Bureau of Mines. No attempt is made to produce coal to supply a regular demand. All the coal is shipped as run-of-mine.

CREIGHTON. HITE MINE.

Sample.—Bituminous coal; Beaver field; analyses Nos. 11130, 11132, and 11133 (p. 68).

Mine.—Hite; a drift mine in the Pittsburgh district, at Creighton, on the Western Pennsylvania branch of the Pennsylvania Railroad. The mine opening is about one-eighth of a mile from the Allegheny River but none of the coal is shipped by water.

Coal beds.—Upper Freeport or E and Lower Freeport or D, of the State Geological Survey. Carboniferous age, Allegheny formation. At this mine the beds are separated by less than 1 foot of bony coal. Average thickness about 5 feet 10 inches. The coal outcrops on a hillside and lies practically level; slight variations of dip are due to local rolls. The face cleavage strikes approximately northeast and the butt cleavage about southwest. The coal is of good quality. The immediate roof, a hard gray shale, is overlain by about 1 foot 6 inches of cannel coal. The floor is a smooth hard fire clay. The bed was measured and sampled at two points in the mine by L. M. Jones and J. J. Rutledge on October 28, 1910, as described below:

Sections of coal bed in Hite mine.

Section.....	A	B
Laboratory No.....	11130	11132
Roof, cannel coal.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, clean and hard.....	0 4	0 4
Mother coal.....	0	0 $\frac{1}{2}$
Coal.....	2 4	2 2
Coal, bony.....	a 0 11	a 0 8
Coal.....	2 7	2 8 $\frac{1}{2}$
Floor, fire clay.....		
Thickness of bed.....	5 10	5 11
Thickness of coal sampled.....	4 11	5 3

a Not included in sample.

Section A (sample 11130) was taken at the face of room 17, off first butt entry, about 8,000 feet west of the mine mouth.

Section B (sample 11132) was taken at the face of room 18, off third butt entry 9,000 feet from the mine mouth.

A grab sample of the cannel coal, 1 foot 3 inches thick, from above the coal mined was taken at the intersection of the line entry and main entry 1, for approximate analysis of which see Laboratory No. 11133.

Notes.—The coal is mined by the room-and-pillar system. At the time of sampling the tipple had screens, and there was trackage for 25 or 30 cars. The daily output was about 350 tons. The mine is old, having been in operation about 30 or 40 years.

OAK STATION. OAK MINE.

Sample.—Bituminous coal; Pittsburgh field; analysis No. 10845 (p. 68).

Mine.—Oak, a drift mine at Oak Station in the Pittsburgh district, on the Castle Shannon (narrow gage) railroad, a short distance south of Pittsburgh.

Coal bed.—Pittsburgh. Carboniferous age, Allegheny formation. Average thickness, 5 feet 4 inches. The roof, a "draw slate" about 12 inches thick, is overlain with 12 inches of bony coal with a sandstone cap rock. The floor at the point of sampling is limestone. The coal lies practically level. Cover at point of sampling, 85 feet. The bed was measured and sampled at one point in the mine by L. M. Jones on September 9, 1910, as described below:

Section of coal bed in the Oak mine.

Laboratory No.	10845
Roof, "draw slate,"	<i>Ft. in.</i>
Coal	0 7
"Sulphur" band	a 0 $\frac{1}{2}$
Coal	2 11
"Sulphur" band	a 0 $\frac{3}{4}$
Coal	0 1 $\frac{1}{2}$
"Sulphur" band	a 0 $\frac{1}{4}$
Coal	1 7 $\frac{1}{2}$
Floor, limestone	
Thickness of bed	5 4 $\frac{1}{2}$
Thickness of coal sampled	5 3

a Not included in sample.

This section (sample 10845) was measured in room 10, off left entry 13, 5,300 feet north of the mine mouth.

Notes.—The coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut with punching machines and shot down with FF black powder. The mine was equipped for producing 400 tons a day; about 60 per cent of the output was from advance workings, the remainder from pillars. When the pillars were robbed the recovery amounted to about 90 per cent of the coal. All of the coal was screened over 14-inch bar screens; the screenings amounted to about 30 per cent of the output.

BEDFORD COUNTY.

HOPEWELL. CAMBRIA No. 3 MINE.

Sample.—Semibituminous coal; Broadtop field; analyses Nos. 15055, 15056, 15057, 15058, 15059, and 15060 (pp. 68, 69).

Mine.—Cambria No. 3, a shaft mine 2 miles east of Hopewell, on the Huntingdon & Broadtop Railroad.

Coal bed.—Upper Freeport, locally known as the Kelley. Carboniferous age, Allegheny formation. Thickness, 3 to 5 feet, average 4 feet. There is about 6 inches of

"draw slate" above the coal. Roof, smooth shale; floor, smooth brittle underclay, particles of which sometimes were mixed with the coal in loading. Cover at points of sampling, 225 feet.

The bed was measured and sampled at five points in the mine by H. I. Smith on November 8 and 9, 1912, as described below.

Sections of coal bed in Cambria No. 3 mine.

Section.....	A	B	C	D	E
Laboratory No.....	15055	15056	15057	15058	15059
Roof, shale and "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 4½	α 0 4½	1 4	1 4	1 4½
Shale.....	0 ½	α 0 ½	.. ..	.. ..	.. ..
Coal.....	0 6	1 7	.. ..	.. ..	.. ..
Mother coal and "sulphur".....	0 ½	.. ..	.. ..	.. ..	.. ..
Coal.....	0 2½	.. ..	.. ..	.. ..	.. ..
Coal, hard, gray.....	0 3½	0 2	0 4	0 3½	.. ..
Coal, broken.....	.. ..	.. ..	.. ..	.. ..	0 6½
Coal.....	0 4	0 8	0 5	0 3½	.. ..
Coal and broken shale mixed.....	0 2½	.. ..	0 3½	0 5	.. ..
Coal, bony.....	.. ..	0 3	.. ..	.. ..	.. ..
Coal, soft, brittle.....	.. ..	0 2½	.. ..	.. ..	.. ..
Coal.....	0 8½	.. ..	0 8½	1 2	0 8½
"Sulphur".....	0 8	.. ..	Streak.	.. ..	Streak.
Coal, bony.....	.. ..	.. ..	.. ..	0 ½	.. ..
Coal.....	0 9½	1 5	0 4	0 5	1 0
Shale.....	α 0 1	.. ..	0 2	.. ..	.. ..
Coal.....	0 4	.. ..	0 4½	0 0	0 0
Floor, clay.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 10½	4 8½	3 11½	3 11½	3 7½
Thickness of coal sampled.....	3 9½	4 3½	3 11½	3 11½	3 7½

α Not included in sample.

Section A (sample 15055) was measured at the face of room 7 off second heading, 7,000 feet northeast of the shaft.

Section B (sample 15056) was measured near the face, 600 feet to the right from top of third plane, 5,100 feet northeast of the shaft.

Section C (sample 15057) was measured at the face of second heading, 7,300 feet northeast of the shaft.

Section D (sample 15058) was measured at the face of third heading, 7,400 feet northeast of the shaft.

Section E (sample 15059) was measured at a point 200 feet from face of fourth heading, 7,000 feet northeast from shaft.

A composite sample was made by combining face samples 15055, 15056, 15058, and 15059. The results of an ultimate analysis of this sample is given under laboratory No. 15060.

Notes.—The room-and-pillar system of mining is employed. At the time of sampling the coal was undercut by hand and shot down by FFF black powder. All coal was shipped as run-of-mine. Pickers were employed on the cars in loading. There were two tracks with a capacity of 32 empty cars and 32 loaded cars.

CAMBRIA COUNTY.

BARNESBORO. ALLPORT MINE.

Sample.—Bituminous coal; Windber field; analyses Nos. 12221, W19738, W19739, W19740, W19741, W19742, and W19743 (p. 69).

Mine.—Allport, a drift mine in the Clearfield district, 1 mile east of Barnesboro, on the Pennsylvania Railroad.

Coal beds.—Lower Freeport or D and Upper Freeport or E. Carboniferous age, Allegheny formation. Average thickness of D bed, 4 feet 5 inches; of E bed, 3 feet 7 inches. Each bed has a roof of smooth shale and a floor of smooth hard fire clay.

The D bed was measured and sampled at three points in the mine and the E bed at three points by P. M. Riefkin on April 26, 1911, as described below:

Sections of D bed in Allport mine.

Section.....	A	B	C
Laboratory No.....	W19740	W19741	W19742
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Cannel coal.....	$\alpha 0 \frac{1}{2}$	0 $1 \frac{1}{4}$	0 $2 \frac{1}{4}$
Coal.....	0 $10 \frac{1}{2}$	1 $4 \frac{1}{4}$	0 10
Mother coal.....	0 $\frac{1}{4}$	0 $\frac{1}{4}$	.. ..
Coal.....	0 $10 \frac{3}{8}$	0 $9 \frac{1}{4}$	.. ..
"Sulphur" and mother coal.....	0 $\frac{1}{4}$	0 1	Streak.
Coal.....	0 $6 \frac{1}{2}$	0 $4 \frac{1}{2}$	1 $4 \frac{1}{2}$
Hard coal.....	0 1	0 1	0 1
Coal.....	0 $9 \frac{1}{2}$	1 $1 \frac{1}{2}$	1 1
Shale.....	$\alpha 0 \frac{1}{2}$	$\alpha 0 \frac{3}{4}$	$\alpha 0 \frac{1}{2}$
Coal.....	1 $\frac{1}{2}$	0 $11 \frac{1}{4}$	0 $11 \frac{1}{2}$
Floor, hard fire clay ("bastard slate").			
Thickness of bed.....	4 $4 \frac{1}{8}$	4 $10 \frac{1}{4}$	4 8
Thickness of coal sampled.....	4 $1 \frac{1}{8}$	4 $9 \frac{1}{2}$	4 $6 \frac{1}{2}$

α Not included in sample.

Section A (sample W19740) was measured at the face of left entry 2, off heading 9, off the main heading, 6,250 feet southeast of the mine mouth.

Section B (sample W19741) was measured on the rib in room 7, left entry 2, off right entry 9, off the main heading, 6,250 feet southeast of the mine mouth.

Section C (sample W19742) was measured at the face of right entry 9, off the main heading, 6,950 feet southwest of the mine mouth.

Sections of E bed in Allport mine.

Section.....	A	B	C
Laboratory No.....	W19738	W19739	W19743
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bony.....	$\alpha 0 \frac{1}{2}$	.. ..	.. ..
Coal.....	0 $11 \frac{1}{2}$	1 1	1 2
"Sulphur" and mother coal.....	$\alpha 0 \frac{5}{8}$	0 $\frac{1}{4}$	0 $\frac{1}{4}$
Coal.....	1 $3 \frac{1}{2}$	0 6	1 $3 \frac{1}{2}$
Mother coal.....	Streak.	Streak.	.. ..
Coal, hard.....	0 5	1 1	0 3
Coal, bony.....	$\alpha 0 \frac{1}{2}$	$\alpha 0 \frac{1}{2}$	0 $\frac{1}{2}$
Coal.....	0 $10 \frac{1}{2}$	0 $9 \frac{1}{4}$	0 $10 \frac{1}{4}$
Floor, hard fire clay ("bastard slate").			
Thickness of bed.....	3 $8 \frac{5}{8}$	3 7	3 $7 \frac{1}{2}$
Thickness of coal sampled.....	3 6	3 6	3 $7 \frac{1}{2}$

α Not included in sample.

Section A (sample W19738) was measured at the face of third right entry, off the main heading, 3,700 feet southeast of the mine mouth.

Section B (sample W19739) was measured at the face of the main slant off the main entry, 3,700 feet southeast of the mine mouth.

Section C (sample W19743) was measured 600 feet in on the second panel from the main slant off the main entry, 2,800 feet south of the mine mouth.

A composite sample was made by combining face samples W19740, W19741, and W19742. The results of an ultimate analysis of this sample are shown under laboratory No. 12221.

Notes.—At the time of sampling the coal was undercut with compressed air punchers and broken down with FFFF black powder. All the coal was shipped as run-of-mine. Pickers were employed on the cars in loading. There was one loading track at the tippie with a capacity of 18 empty and 19 loaded cars. The mine had a capacity of 900 tons a day with an average daily output of 700 tons, 60 per cent of which was from advance workings. It was expected that the output would be increased

to 900 tons a day. There was approximately 235 acres of unmined coal in the D bed and 370 acres in the E bed. The coal from both beds was loaded over the same tippie.

BARNESBORO. CYMBRIA MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. W20394, W20395, W20444, W20445, W20446, and 12372, (p. 69).

Mine.—Cymbria, a shaft mine in the Clearfield district, $1\frac{1}{4}$ miles east of Barnesboro, on the Walnut Run branch of the Pennsylvania Railroad.

Coal bed.—Lower Kittanning, Miller, or B. Carboniferous age, Allegheny formation. Average thickness, 2 feet 10 inches. Roof, shale 3 to 18 feet thick, overlain by bony coal and sandstone; floor, smooth hard fire clay.

The bed was measured and sampled at five points in the mine by E. W. Miller on June 8, 1911, as described below:

Sections of coal bed in Cymbria mine.

Section.....	A	B	C	D	E
Laboratory No.....	W20394	W20395	W20444	W20445	W20446
Roof, sandstone, bony coal, and shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 2 $\frac{1}{2}$	2 0	0 4 $\frac{1}{2}$	1 0	2 11
Mother coal, soft.....	.. ..	0 $\frac{1}{4}$	.. ..	.. ..	.. ..
"Sulphur".....	0 $\frac{1}{8}$	.. ..	a 0 $\frac{3}{8}$	0 $\frac{1}{8}$	.. ..
Coal.....	2 0	0 7	0 6 $\frac{1}{8}$	0 7 $\frac{1}{2}$	.. ..
"Sulphur".....	a 0	.. ..	0 0	0 0	.. ..
Coal.....	0 6 $\frac{1}{8}$	.. ..	0 7 $\frac{1}{8}$	0 9 $\frac{1}{4}$	.. ..
"Sulphur".....	.. ..	.. ..	0 0	.. ..	.. ..
Coal.....	.. ..	.. ..	0 10	.. ..	.. ..
Floor, fire clay.	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	2 10 $\frac{1}{2}$	2 7 $\frac{1}{2}$	2 4 $\frac{5}{8}$	2 5	2 11
Thickness of coal sampled.	2 9 $\frac{1}{2}$	2 7 $\frac{1}{2}$	2 4 $\frac{1}{2}$	2 5	2 11

a Not included in sample.

Section A (sample W20394) was measured at the face of second right entry, about 1,000 feet southwest of the shaft.

Section B (sample W20395) was measured near the face of room 18, off second left entry, about 1,200 feet northeast of the shaft.

Section C (sample W20444) was measured at the face of the main heading, 1,900 feet from the shaft.

Section D (sample W20445) was measured at the face of third left entry, about 1,400 feet northeast of the shaft.

Section E (sample W20446) was measured at the face of third right entry, about 1,200 feet southeast of the shaft.

A composite sample was made by combining face samples W20394, W20395, W20444, W20445, and W20446. The results of an ultimate analysis of this sample are given under laboratory No. 12372.

Notes.—At the time of sampling the coal was undercut with machines and shot down with FFFF black powder. There were no screens, the entire output being shipped as run-of-mine. Pickers were employed on the cars in loading. There was one loading track at the tippie with a capacity of 48 cars. The mine had a capacity of 300 tons a day and an average daily output of 150 tons, all from advance workings. There were between 600 and 700 acres of unmined coal.

BARNESBORO. CYMBRIA No. 1 MINE.

Sample.—Bituminous coal; Windber field; analyses Nos. 12162, 12163, 12164, 12165, 12170, and 12171 (p. 70).

Mine.—Cymbria No. 1, a slope mine in the Clearfield district, 2 miles east of Barnesboro, on the Cresson division of the Pennsylvania Railroad.

Coal bed.—Lower Freeport or D; Carboniferous age, Allegheny formation. Average thickness, 3 feet 6 inches. Roof, smooth dark shale; floor, hard smooth clay. Material from the roof and floor did not become mixed with the coal in mining.

The bed was measured and sampled at three points in the mine on April 28, 1911, and at two points on May 1, 1911, by H. I. Smith, as described below:

Sections of coal bed in Cymbria No. 1 mine.

Section.....	A	B	C	D	E
Laboratory No.....	12162	12163	12164	12170	12171
Roof, sandstone and dark shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bony shale.....	a 0 2	a 0 1	a 0 2½	a 0 2	a 0 2
Coal.....	1 0	0 8½	2 0	1 10	3 2½
Mother coal and "sulphur".....	.. ..	a 0 ½	.. ..	0 ¼	.. ..
Coal.....	0 10	1 0	.. ..	.. ..	.. ..
"Sulphur" and mother coal.....	a 0 ½	a 0 ¼	.. ..	.. ..	.. ..
Coal.....	0 5	1 3	1 4½	0 3	.. ..
Coal, bony.....	0 ½	.. ..	.. ..	0 1	.. ..
Coal.....	0 10½	.. ..	.. ..	1 0	.. ..
Coal.....	.. ..	a 0 1½	.. ..	.. ..	.. ..
"Mining slate".....	a 0 1	a 0 1¾	a 0 ¾	a 0 1½	a 0 ¾
Coal.....	a 0 ½	.. ..	.. ..	.. ..	.. ..
Coal.....	0 11	0 7	0 11½	0 8	0 10½
Floor, hard clay.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	4 5	3 11½	4 7½	4 1¾	4 3½
Thickness of coal sampled.....	4 1	3 6½	4 3½	3 10¼	4 ¾

a Not included in sample.

Section A (sample 12162) was measured at the face of the first crosscut off left entry 2, 5,500 feet from the mine mouth.

Section B (sample 12163) was measured at the face of the eighth right off left entry 2, about 4,000 feet from the mine mouth.

Section C (sample 12164) was measured at the face of the first left off left entry 2, 4,000 feet from the mine mouth.

Section D (sample 12170) was measured at the face of the third right off the second main entry, about 3,200 feet northeast of the mine mouth.

Section E (sample 12171) was measured at the face of the second left off the main heading, 2,900 feet northeast of the drift mouth.

A composite sample was made by combining face samples 12162, 12163, 12164, 12170, and 12171. The results of an ultimate analysis of this sample are given under laboratory No. 12165.

Notes.—At the time of sampling the coal was undercut by chain machines and also by hand. The undercut coal was broken down with FFFF black powder. A permissible explosive was used for brushing the roof and floor. All of the coal was shipped as run-of-mine. Pickers were employed on the cars in loading. The tippie had two loading tracks, with a capacity of 25 empty and 35 loaded cars. The coal from Cymbria No. 1 and Cymbria No. 2½ mines went to the same tippie, and the combined capacity of the two mines was 800 tons a day with an average daily output of 600 tons, 66 per cent of which was from advance workings and the remainder from pillars. There was approximately 175 acres of unmined coal.

BARNESBORO. CYMBRIA No. 2½ MINE.

Sample.—Bituminous coal; Windber field; analyses Nos. 12158, 12159, 12160, 12161, 12172, and 12173 (pp. 70, 71).

Mine.—Cymbria No. 2½, a slope mine in the Clearfield district, 2 miles east of Barnesboro, on the Cresson division of the Pennsylvania Railroad.

Coal bed.—Upper Freeport or E. Carboniferous age, Allegheny formation. Average thickness, 3 feet 6 inches. Roof, a dark, smooth shale, above which is a sandstone cap rock; floor, a smooth, hard clay.

The bed was measured and sampled at three points in the mine by H. I. Smith on April 28, 1911, and at two points on May 1, 1911, as described on the following page.

Sections of coal bed in Cymbria No. 2½ mine.

Section.....	A 12158	B 12159	C 12160	D 12172	E 12173
Laboratory No.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, sandstone, shale.....	.....	.....	.....	.....	.....
Coal.....	.....	.....	0 2	.....	.....
Coal, bony.....	.....	.....	0 ½	.....	.....
Coal.....	.....	.....	0 4	.....	.....
Coal, bony.....	α 0 ½	.....	0 ½	α 0 ½	α 0 ½
Coal (brittle).....	1 5 ½	1 9	0 16	1 6	0 3 ½
"Sulphur" and mother coal.....	0	.....	α 0 ¼	0	0
Coal (firm).....	1 2 ½	0 11	1 1 ½	1 1 ½	1 7 ½
Mother coal.....	.....	.....	.....	.....	0
Coal.....	.....	.....	.....	.....	0 10
Coal.....	.....	α 0 1	α 0 ½	.....	.....
"Slate binder".....	α 0 1	α 0 ½	α 0 1 ½	α 0 2	α 0 1
Coal.....	α 0 1 ½	α 0 1	α 0 ¾	.....	.....
Coal.....	0 9	0 9	0 11	0 10	0 10 ½
Floor, hard fire clay.....	.....	.....	.....	.....	.....
Thickness of bed.....	3 7 ½	3 7 ½	3 7 ½	3 7 ½	3 9 ½
Thickness of coal sampled.....	3 4 ½	3 5	3 4 ½	3 4 ½	3 8

α Not included in sample.

Section A (sample 12158) was measured at the face of left entry 2, about 2,000 feet from the mine mouth.

Section B (sample 12159) was measured at the face of room 12 off the main heading, 2,200 feet from the mine mouth.

Section C (sample 12160) was measured at the face of the third left main heading.

Section D (sample 12172) was measured at the face of room 6 off the main heading, 1,500 feet southwest of the mine mouth.

Section E (sample 12173) was measured at the face of room 8 off the second left heading, 1,200 feet southwest of the mine mouth.

A composite sample was made by combining face samples 12158, 12159, 12160, 12172, and 12173. The results of an ultimate analysis of this sample are shown under laboratory No. 12161.

Notes.—As Cymbria No. 1 mine and Cymbria No. 2½ mine use the same tippie, the notes on Cymbria No. 1 are applicable to Cymbria No. 2½.

BARNESBORO. EMPIRE A MINE.

Sample.—Bituminous coal; Windber field; analyses Nos. 12212, W19643, W19644, W19645, W19646, W19647, and W19648 (p. 71).

Mine.—Empire A, a drift mine in the Clearfield district, three-fourths of a mile west of Barnesboro, on the New York Central and the Pennsylvania Railroad.

Coal bed.—Lower Freeport or D. Carboniferous age, Allegheny formation. Average thickness, 4 feet 4 inches. Roof, shale; between the shale and the coal is a stratum of cannon coal about 2 inches thick. Floor, hard smooth fire clay. Material from the roof and floor did not become mixed with the coal in mining.

The bed was measured and sampled at six points in the mine by P. M. Riefkin on April 28, 1911, as described below:

Sections of coal bed in Empire A mine.

Section.....	A W19643	B W19644	C W19645	D W19646	E W19647	F W19648
Laboratory No.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, shale.....	.....	.....	.....	.....	.....	.....
Cannon coal.....	α 0 2	α 0 2	α 0 1 ¼	α 0 2	α 0 1	α 0 2
Coal.....	0 7	0 3 ½	0 7	0 8	0 6 ½	0 7
Coal, bony, and shale.....	α 0 1 ½	.....	.....	α 0 ½	α 0 ½	α 0 1
Coal, hard, gray.....	.....	0 1	.....	.....	.....	.....
Coal.....	1 2	1 10	.....	1 1 ½	0 5 ½	1 1
Mother coal.....	0 ¼	0 ½	Streak.	0 ¼	Streak.	0
Coal.....	0 8 ½	1 1	2 2	0 10	1 7 ½	1 10 ½
Mother coal.....	0 7 ½	.....	0 ¼	0 ¼	0	.....
Coal.....	0 9 ½	.....	0 7	0 7 ½	0 2 ½	.....
Shale.....	α 0 1	α 0 1 ½	α 0 ¾	α 0 1	α 0 1	α 0 1
Coal.....	0 8 ½	0 11	0 10	0 8 ½	0 8	0 11 ½
Floor, hard fire clay.....	.....	.....	.....	.....	.....	.....
Thickness of bed.....	4 4 ½	4 6 ½	4 4 ½	4 3 ½	3 9 ½	4 10 ½
Thickness of coal sampled.....	4 ½	4 3	4 2 ½	4 ½	3 6 ½	4 6 ½

α Not included in sample.

Section A (sample W19643) was measured in room 1 off left entry 5 off new parallel heading, 14,000 feet northwest of the drift mouth.

Section B (sample W19644) was measured near the face of room 4 off old first left heading off the main entry, 2,000 feet northwest of the drift mouth.

Section C (sample W19645) was measured at the corner of the back heading on right entry 3 off the old parallel heading, 3,000 feet northeast of the drift mouth.

Section D (sample W19646) was measured 40 feet from the face of the parallel heading off the main entry, 9,000 feet northeast of the drift mouth.

Section E (sample W19647) was measured at the face of room 24 off left entry 14 off the main entry, 11,000 feet northwest of the drift mouth.

Section F (sample W19648) was measured at the face of room 17 off left entry 3 off the new parallel heading, 14,000 feet northwest of the drift mouth.

A composite sample was made by combining face samples W19643 to W19648, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 12212.

Notes.—At the time of sampling the coal was undercut by compressed-air punchers and broken down with FFFF black powder. There was one loading track at the tipple, and the entire production was shipped as run-of-mine. Pickers were employed on the car in loading. The mine had a capacity of about 1,000 tons a day, with an average daily output of 625 tons, 75 per cent of which was from advance workings. There were approximately 750 acres of unmined coal.

BEAVERDALE. PENNSYLVANIA NO. 15 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12174, 12175, 12176, 12177, 12178, and 12179 (p. 71).

Mine.—Pennsylvania No. 15, a shaft mine in the Clearfield district, at Beaverdale, on the South Fork branch of the Pennsylvania Railroad.

Coal bed.—Lower Kittanning or B; Carboniferous age, Allegheny formation. Thickness, 3 feet to 3 feet 8 inches; dip, 3° north. Roof, bony coal, 5 inches thick, with sandstone cap rock; floor, hard smooth fire clay. Material from the roof and floor did not mix with the coal in mining.

The bed was measured and sampled at five points in the mine by E. G. Borden on May 1, 1911, as described below:

Sections of coal bed in Pennsylvania No. 15 mine.

Section.....	A	B	C	D	E
Laboratory No.....	12174	12175	12176	12177	12179
Roof, sandstone, and bony coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 2	.. ..	.. ..	0 3½	0 6½
Mother coal.....	0 ½	.. ..	.. ..	.. ..	.. ..
Coal.....	1 7	.. ..	.. ..	.. ..	.. ..
Coal, gray.....	.. ..	.. ..	.. ..	.. ..	0 1½
"Sulphur".....	Streak.	.. ..	.. ..	Streak.	.. ..
Coal.....	1 1½	2 9	3 4	3 ½	2 5
Mother coal.....	0 ½	0 ½	.. ..	.. ..	.. ..
Coal.....	0 4	0 7	.. ..	.. ..	.. ..
Floor, hard fire clay.	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 3	3 4½	3 4	3 3½	3 1
Thickness of coal sampled.....	3 3	3 4½	3 4	3 3½	3 1

Section A (sample 12174) was measured near the face of the first slant off right heading 5 off the first dip off the main entry.

Section B (sample 12175) was measured at the face of the sump for the main dip, off left heading 4 off the first dip off the main entry.

Section C (sample 12176) was measured at the face of the first slant off right heading 4 off the first dip off the main entry.

Section D (sample 12177) was measured at the face of the first slant off right heading 3 off the first dip off the main entry.

Section E (sample 12179) is a pillar sample taken in room 23 off right heading 3 off the first dip off the main entry.

A composite sample was made by combining face samples 12174 to 12177, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 12178.

Notes.—The shaft is 624 feet deep. At the time of sampling the coal was undercut with compressed-air punching machines and broken down with black powder. Dynamite was used for brushing the roof and floor. All of the coal was shipped as run-of-mine. Pickers were employed on the cars in loading. There were two loading tracks at the tippie with a capacity of 25 empty and 22 loaded cars. The daily output was 450 tons, about 80 per cent of which was from advance workings.

BENS CREEK. BENS CREEK NO. 1 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12211, W19697, W19700, W19702, W19736, and W19737 (p. 72).

Mine.—Bens Creek No. 1, a shaft mine in Portage township, 1 mile east of Bens Creek, on the Bens Creek branch of the Pennsylvania Railroad.

Coal bed.—Lower Kittanning, Miller, or B. Carboniferous age, Allegheny formation. Average thickness, 3 feet 6 inches. Roof, hard gray smooth shale; floor, smooth hard shale, underlain by fire clay.

The bed was measured and sampled at five points in the mine by E. W. Miller on May 2, 1911, as described below:

Sections of coal bed in Bens Creek No. 1 mine.

Section.....	A	B	C	D	E
Laboratory No.	W19697	W19700	W19702	W19736	W19737
Roof, shale and bony coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 0	1 9 ³ / ₄	.. ..	.. ..	0 5 ¹ / ₂
“Sulphur” streak.....	0 1 ³ / ₈	0 1 ¹ / ₂	.. ..	.. ..	0 1 ³ / ₈
Coal.....	1 6 ¹ / ₂	0 7 ¹ / ₂	3 9	3 4	3 2 ³ / ₈
“Sulphur” streak.....	.. ..	0 8	.. ..	.. ..	.. ..
Coal.....	.. ..	0 8	.. ..	.. ..	.. ..
Floor, shale and fire clay.	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 6 ⁵ / ₈	3 1 ¹ / ₂	3 9	3 4	3 7 ³ / ₈
Thickness of coal sampled.....	3 6 ⁵ / ₈	3 1 ¹ / ₂	3 9	3 4	3 7 ³ / ₈

Section A (sample W19697) was measured on the barrier pillar on No. 2 sidetrack, 100 feet from room 21 and 3,200 feet southwest of the old main heading.

Section B (sample W19700) was measured on the pillar on No. 1 sidetrack between the manway and room 1, 1,200 feet southwest of the shaft.

Section C (sample W19702) was measured on the main pillar of the old main heading, 900 feet southwest of the shaft.

Section D (sample W19736) was measured at the face of heading 6, off the first dip, 700 feet southeast of the shaft.

Section E (sample W19737) was measured on the pillar of heading 1, between rooms 27 and 28, 2,700 feet southwest of the shaft.

A composite sample was made from face samples W19697, W19700, W19702, and W19737. The results of an ultimate analysis of this sample are shown under laboratory No. 12211.

Notes.—At the time of sampling the coal was undercut by hand and shot down with black powder. There were no screens, the entire output being shipped as run-of-mine. Pickers were employed on the cars in loading. There was one loading track at the tippie with a capacity of 24 cars. The mine had a capacity of 230 tons a day and an average daily output of about 225 tons, all from pillar workings.

BENS CREEK. PENNSYLVANIA NO. 2 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. W19695, W19696, W19698, W19699, W19701, and 12222 (pp. 72, 73).

Mine.—Pennsylvania No. 2, a slope mine 1 mile south of Bens Creek, on the Bens Creek branch of the Pennsylvania Railroad.

Coal bed.—Lower Kittanning, Miller, or B. Carboniferous age, Allegheny formation. Average thickness, 3 feet 6 inches. Roof, shale overlain by sandstone cap rock; floor, smooth shale underlain by fire clay.

The bed was measured and sampled at five points in the mine by E. W. Miller on May 1, 1911, as described below:

Sections of coal bed in Pennsylvania No. 2 mine.

Section.....	A	B	C	D	E
Laboratory No.....	W19695	W19696	W19698	W19699	W19701
Roof, sandstone, shale, and bony coal.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 6	1 3	1 3	1 0	1 2½
Mother coal, hard.....	0 3	0 3	0 3	0 3	0 2½
Coal.....	0 6¾	0 9½	2 4	2 4½	0 6½
"Sulphur" streak.....	a 0	0	.. ..	.. ..	0 1
Coal.....	0 8½	0 7½	.. ..	.. ..	0 3¾
"Sulphur" streak.....	a 0	0	.. ..	.. ..	0 4
Coal.....	0 8¾	0 5	.. ..	.. ..	1 5
"Sulphur" ball.....	a 0 1	.. ..	.. ..	.. ..	.. ..
Coal.....	0 1	.. ..	.. ..	.. ..	.. ..
Shale.....	.. ..	a 0 1	.. ..	.. ..	.. ..
Coal.....	.. ..	0 3	.. ..	.. ..	.. ..
Floor, shale and fire clay.	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 9½	3 3½	3 7½	3 5	3 6½
Thickness of coal sampled.....	3 7¼	3 3¾	3 7¼	3 5	3 6¼

a Not included in sample.

Section A (sample W19695) was measured at the face of heading 19, 4,100 feet north-east of the drift mouth.

Section B (sample W19696) was measured on the pillar between rooms 14 and 15 off main heading 4, 2,900 feet northwest of the drift mouth.

Section C (sample W19698) was measured on the pillar between rooms 2 and 3 off butt entry 17, 3,900 feet north of the drift mouth.

Section D (sample W19699) was measured on the pillar between rooms 1 and 2 off butt entry 16, 3,900 feet north of the drift mouth.

Section E (sample W19701) was measured on the pillar between rooms 21 and 22 off heading 5, 3,200 feet north of the drift mouth.

Notes.—At the time of sampling the coal was undercut by hand and shot down with black powder. About 90 per cent of the coal was shipped as run-of-mine; the remaining 10 per cent was passed over 8-foot bar screens with 4-inch openings. Pickers were employed on the cars in loading. There were two loading tracks with a capacity of 25 cars. The mine was equipped to produce 200 tons a day and had an average daily output of 175 tons, practically all of which was from pillar workings. The intent was to increase the output to about 200 tons.

CARROLLTOWN ROAD. LOGAN NO. 5 MINE.

Sample.—Bituminous coal; Windber field; analyses Nos. 12370, W20364, W20365, W20366, W20367, and W20368 (p. 73).

Mine.—Logan No. 5, a drift mine one-fourth of a mile west of Carrolltown Road, on the Cresson division of the Pennsylvania Railroad.

Coal bed.—Miller. Carboniferous age, Allegheny formation. Average thickness, 2 feet 8 inches. Roof, hard shale overlain by bony coal and sandstone; floor, smooth, hard fire clay.

The bed was measured and sampled at five points in the mine by E. W. Miller on June 7, 1911, as described on the following page.

Sections of coal bed in Logan No. 5 mine.

Section.....	A	B	C	D	E
Laboratory No.....	W20364	W20365	W20366	W20367	W20368
Roof, sandstone, bony coal, and shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 6	0 6 $\frac{1}{2}$	1 10	0 6 $\frac{1}{2}$	0 5
"Sulphur" streak.....	0 7 $\frac{1}{8}$	0 7 $\frac{1}{8}$	0 8	0 7 $\frac{1}{8}$	0 7 $\frac{1}{8}$
Coal.....	0 7	0 7 $\frac{1}{2}$	0 8	1 9 $\frac{1}{2}$	0 7 $\frac{1}{2}$
"Sulphur" streak.....	0 7 $\frac{1}{8}$	0 7 $\frac{1}{8}$	0 8	1 9 $\frac{1}{2}$	0 7 $\frac{1}{8}$
Coal.....	1 5 $\frac{1}{2}$	0 10	1 10	1 9 $\frac{1}{2}$	1 5 $\frac{1}{2}$
Floor, fire clay.					
Thickness of bed.....	2 6 $\frac{1}{2}$	2 5 $\frac{9}{16}$	2 6 $\frac{1}{8}$	2 4 $\frac{1}{2}$	2 6 $\frac{1}{4}$
Thickness of coal sampled.....	2 6 $\frac{1}{2}$	2 5 $\frac{9}{16}$	2 6 $\frac{1}{8}$	2 4 $\frac{1}{2}$	2 6 $\frac{1}{4}$

Section A (sample W20364) was measured in the first main heading, 4,300 feet south of the mine mouth.

Section B (sample W20365) was measured at the face of right entry 2; 250 feet from the second main heading and 3,750 feet south of the mine mouth.

Section C (sample W20366) was measured at the face of room 8 off the air course of right entry 1, off the second main entry, 4,300 feet south of the mine mouth.

Section D (sample W20367) was measured at the face of the second main heading, 3,600 feet southeast of the mine mouth.

Section E (sample W20368) was measured at the face of the fourth left heading off the second main heading, 3,200 feet southeast of the mine mouth.

A composite sample was made by combining face samples W20364 to W20368, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 12370.

Notes.—At the time of sampling the coal was undercut both by hand and with machines, and shot down with black powder. There were no screens, the output being shipped as run-of-mine. Pickers were employed on the cars in loading. There was one loading track at the tippie with a capacity of 50 cars. The mine had a capacity of 600 tons a day with an average daily output of about 350 tons, all of which was from advance workings. The intent was to increase the production to about 700 tons a day. There were approximately 700 acres of unmined coal.

COLVER. COLVER MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 13634 to 13643, inclusive (p. 73).

Mine.—Colver, a drift mine, in the Ebensburg district, at Colver, the terminus of the Cambria & Indiana Railroad.

Coal bed.—Known as the Lower Kittanning or B. Carboniferous age, Allegheny formation. Average thickness, 4 feet. Roof, hard gray shale, with smooth surface; floor, shaly underclay with a smooth surface.

The bed was measured and sampled at nine points in the mine by L. M. Jones, on March 28 and 29, 1912, as described below:

Sections of coal bed in Colver mine.

Section.....	A	B	C	D	E	F
Laboratory No.....	13634	13635	13636	13637 13643	13638 13642	13639 13641
Roof, gray shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bony.....	a0 3	a0 3	a0 3	a0 5	a0 4	a0 5
Coal, soft.....	1 1	2 8 $\frac{1}{2}$	2 1 $\frac{1}{2}$	3 10	2 4 $\frac{1}{2}$	0 9
Coal, dull.....	0 1	0 1	0 1	0 1	0 1	0 1
Shale.....	0 1	0 1	0 1	0 1	0 1	0 1
Coal, soft.....	1 0	1 0	1 0	1 0	1 0	1 0
"Sulphur" band.....	a0 1	a0 1	a0 1	a0 1	a0 1	a0 1
Coal.....	0 5 $\frac{1}{2}$	1 1 $\frac{1}{2}$	1 8 $\frac{1}{2}$	1 1 $\frac{1}{2}$	1 1 $\frac{1}{2}$	1 8 $\frac{1}{2}$
Shale.....	0 1	0 1	0 1	0 1	0 1	0 1
Coal.....	1 1	1 1	1 1	1 1	1 1	1 1
Floor, shaly underclay.						
Thickness of bed.....	3 11	4 1 $\frac{1}{2}$	4 2	4 3	3 10	4 1
Thickness of coal sampled.....	3 7 $\frac{1}{2}$	3 10	3 10 $\frac{1}{2}$	3 10	3 6	3 7 $\frac{1}{2}$

a Not included in sample.

Section A (sample 13634) was cut from the face of main entry A, 2,400 feet southwest of bore hole 25.

Section B (sample 13635) was cut from the face of entry A-2, 1,175 feet southeast from bore hole 25.

Section C (sample 13636) was cut from the face of entry A-3, 1,400 feet south of bore hole 25.

Section D (duplicate samples 13637 and 13643) was cut from the face of the main entry, 1,200 feet southeast of bore hole 25.

Section E (duplicate samples 13638 and 13642) was cut from the face of entry B-1), 725 feet southeast of bore hole 25, at the inner end of the rock tunnel.

Section F (duplicate samples 13639 and 13641) was cut from the face of entry A-1, 950 feet southeast of bore hole 25.

A composite sample was made by mixing samples 13634 to 13639 inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 13640.

Notes.—This mine was originally opened by a slope and shaft but at the time of sampling all the coal shipped was hauled to the surface through a rock tunnel 2,050 feet long.

The steel tippie was designed to handle 4,000 tons of coal a day. There were two loading tracks with a capacity of 80 empty cars. The tippie was equipped with a shaking screen having perforations $1\frac{1}{4}$ inches in diameter, but the entire output was shipped as run-of-mine.

The coal was undercut with chain cutting machines and with punching machines and shot down with FFFF black powder. The impurities that might be loaded with the coal were a bony coal at the top of the seam, which in places stuck to the roof, and a "sulphur" band below the middle. The roof and floor were hard and generally smooth and were not likely to get mixed with the coal.

The average daily output, the mine working double shifts, was 1,000 tons. There was 8,000 acres of coal land at this mine, the development of which was still in an early stage. The maximum day's run was 1,040 tons.

DUNLO. HENRIETTE MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 14238 to 14246, inclusive (p. 74).

Mine.—Henriette, a shaft mine 1 mile south of Dunlo, on the South Fork branch of the Pennsylvania Railroad, with connections to the main line at South Fork.

Coal bed.—Miller or B. Carboniferous age, Allegheny formation. Thickness, about 3 feet 8 inches; dip, $7\frac{1}{2}^{\circ}$ northwest. Roof, smooth shale 1 to 10 feet thick, above which is a sandstone cap rock. Floor, hard, smooth fire clay. The parting between the floor and the coal and the roof is distinct, so that neither the floor or the roof material got mixed with the coal in mining. Cover at points of sampling, 130 to 400 feet.

The bed was measured and sampled at five points in the mine by A. H. Fay, on June 27, 1912, as described below:

Sections of coal bed in Henriette mine.

Section.....	A	B	C	D	E
Laboratory No.....	14245 14238	14246 14239	14244 14240	14241	14242
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Top coal or bone.....	0 4	0 3	0 2	0 $3\frac{1}{2}$	...
Coal.....	3 $5\frac{1}{2}$	3 7	3 $4\frac{1}{2}$	3 4	3 8
Floor, shale and fire clay.....					
Thickness of bed.....	3 $9\frac{1}{2}$	3 10	3 $6\frac{1}{2}$	3 $7\frac{1}{2}$	3 8

Section A (sample 14238 is the good coal and sample 14245 is the bone or top coal) was measured on the rib of room 2, right heading 1 off slope 2, about 700 feet north of shaft No. 2.

Section B (sample 14239 is the good coal and sample 14246 is the bone or top coal) was measured at the junction of the sixth slant and main heading, about 3,050 feet north of shaft No. 2.

Section C (sample 14240 is the good coal and sample 14244 is the bone or top coal) was measured on the pillar of sixth left entry near room 13, north of the rock fault, 4,350 feet northwest of shaft No. 2.

Section D (sample 14241) was measured on the pillar of sixth left heading, 450 feet north of the back heading of slope 2 and 4,150 feet northwest of shaft No. 2.

Section E (sample 14242) was measured on the rib between rooms 1 and 2, first level above the main entry, about 1,500 feet northwest of shaft No. 2.

A composite sample was made by combining samples 14238 to 14242, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 14243.

Notes.—The mine is opened by a shaft 90 feet deep, from the bottom of which a slope extended a distance of about 7,000 feet. The coal is mined by the room-and-pillar system. That part of the mine from which these samples were taken had been practically abandoned for a number of years, and at the time of sampling no mining was being done there. It was proposed to pull the pillars later. Other property tributary to this slope was producing about 700 tons a day. All of the coal was shipped as run-of-mine. Pickers were employed on the car in loading. The coal is somewhat friable and does not yield extra large lumps. There were two loading tracks with a capacity of 25 to 30 cars.

EL MORA. PEERLESS NO. 1 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12134, 12135, 12136, 12137, 12138, and 12139 (p. 75).

Mine.—Peerless No. 1, a drift mine in Carroll Township, near El Mora on the Pennsylvania Railroad.

Coal bed.—Lower Kittanning or B. Carboniferous age, Allegheny formation. Average thickness, about 3 feet; dip, about 3°. The immediate roof is a "draw slate" about 18 inches thick, above which there is a sandstone cap rock. Floor, hard rough fire clay. The bed was measured and sampled at five points in the mine by P. M. Riefkin on April 27, 1911, as described below:

Sections of coal bed in Peerless No. 1 mine.

Section.....	A	B	C	D	E
Laboratory No.....	12134	12135	12136	12137	12138
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, hard.....	0 4	0 5	.. ..	0 5½	0 5½
Coal.....	0 4	.. ..	.. ..	0 8½	.. ..
Bone.....	0 ½	0 ½	.. ..	.. ..	.. ..
Mother coal.....	.. ..	.. ..	.. ..	0 ½	.. ..
Coal.....	2 5	2 7	2 9	0 9	.. ..
"Sulphur".....	0 ¼	.. ..	a 0 ½	0 ¼	0 ¼
Coal.....	0 2½	.. ..	0 2	1 0	2 5½
Floor, fire clay.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 3¼	3 ½	2 11½	2 11¾	2 11¼
Thickness of coal sampled.....	3 3½	3 ½	2 11	2 11¾	2 11¼

a Not included in sample.

Section A (sample 12134) was measured on a heading stump on left heading 3 off the main entry, about 1,700 feet northeast of the drift mouth.

Section B (sample 12135) was measured at the face of room 1, off right heading 8 off the main entry, 2,300 feet east of the drift mouth.

Section C (sample 12136) was measured at the face of left heading 7 off the main entry, about 2,800 feet northeast of the drift mouth.

Section D (sample 12137) was measured on the rib of room 1, off right heading 3 off the main heading, 1,600 feet southeast of the drift mouth.

Section E (sample 12138) was measured in heading 1 off the main entry, about 425 feet from the main entry.

A composite sample was made by combining face samples 12134 to 12138, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 12139.

Notes.—The mine is opened by entry; the cover at the opening is 40 feet. The room-and-pillar method of mining is used. At the time of sampling FFFF black powder was used for breaking the coal. All of the coal was shipped as run-of-mine. Pickers were employed on the cars in loading. The mine had a daily output of about 125 tons a day, 75 per cent of which was from advance workings and the remainder from pillars.

FIGART. FRICK NO. 2 MINE.

Sample.—Bituminous coal; Windber field; analyses Nos. 12366, W20433, W20434, W20474, W20475, and W20476 (p. 75).

Mine.—Frick No. 2, a drift mine $1\frac{1}{4}$ miles northeast of Figart, on the Pennsylvania Railroad.

Coal bed.—C or Middle Kittanning. Carboniferous age, Allegheny formation. Average thickness, 2 feet 7 inches. Roof, dark shale; floor, medium soft fire clay with a smooth surface. The B bed, or Lower Kittanning, is also worked at this mine, and the coal is delivered to the same tippie as is the coal from the C bed.

The C bed was measured and sampled at five points in the mine by H. I. Smith on June 10, 1911, as described below.

Sections of coal bed in Frick No. 2 mine.

Section.....	A	B	C	D	E
Laboratory No.....	W20433	W20434	W20474	W20475	W20476
Roof, dark shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bony.....	a 0 8	a 0 9 $\frac{1}{2}$	a 0 10 $\frac{1}{2}$	a 0 9	a 0 10
Coal.....	1 3 $\frac{1}{2}$	1 3 $\frac{1}{2}$	0 4 $\frac{1}{2}$	0 6	1 3
Coal, gray.....	.. ..	.. ..	0 1	0 $\frac{1}{2}$	.. ..
Shale.....	0 $\frac{1}{4}$	.. ..	.. ..	.. ..	.. ..
Coal.....	0 1	.. ..	0 8 $\frac{1}{2}$	0 10	.. ..
Cannel coal.....	0 1	0 1	a 0 3	0 $\frac{1}{2}$	a 0 2
Coal, bony.....	a 0 1	.. ..	.. ..	.. ..	.. ..
Coal.....	0 9	0 9	0 10 $\frac{1}{2}$	0 11	0 8 $\frac{1}{2}$
Coal streaked with "sulphur".....	a 0 2 $\frac{3}{4}$	(b)	.. ..	.. ..	.. ..
Coal.....	.. ..	0 2	.. ..	.. ..	.. ..
Floor, fire clay.					
Thickness of bed.....	3 2 $\frac{1}{2}$	3 1	3 2 $\frac{1}{2}$	3 1	2 11 $\frac{1}{2}$
Thickness of coal sampled.....	2 2 $\frac{3}{4}$	2 3 $\frac{1}{2}$	2 $\frac{3}{4}$	2 4	1 11 $\frac{1}{2}$

a Not included in sample.

b "Sulphur" streak.

Section A (sample W20433) was measured at the face of the second main heading, 400 feet from the mouth of the main entry.

Section B (sample W20434) was measured at the face of entry 1, off the second main heading, 400 feet from the mouth of the main entry.

Section C (sample W20474) was measured at the face of room 5, off the main left heading, 850 feet from the mouth of the main entry.

Section D (sample W20475) was measured at the face of the first left heading, 500 feet from the mouth of the main entry.

Section E (sample W20476) was measured at the face of the straight main heading, 1,200 feet from the mouth of the entry.

A composite sample was made by combining face samples W20433, W20434, W20474, W20475, and W20476. The results of an ultimate analysis of this sample are shown under laboratory No. 12366.

Notes.—At the time of sampling the coal was undercut by hand and shot down with FFFF black powder. There were no screens, the entire output being shipped as run-of-mine. Pickers were employed on the cars in loading. There was one loading track with a capacity of 28 cars. The mine had a capacity of 100 tons and an average daily output of 80 tons, of which the larger part was from advance workings. There were approximately 50 acres of unmined coal tributary to this opening.

HASTINGS. MILLER RUN MINE.

Sample.—Bituminous coal; Windber field; analyses Nos. 12371, W20440, W20441, W20442, W20443, and W20447 (p. 76).

Mine.—Miller Run, a drift mine $2\frac{1}{2}$ miles northeast of Hastings, on the Cresson division of the Pennsylvania Railroad.

Coal bed.—Miller or B. Carboniferous age, Allegheny formation. Average thickness, 3 feet. Roof, shale overlain by sandstone; floor, smooth fire clay.

The bed was measured and sampled at five points in the mine by E. W. Miller on June 9, 1911, as described below:

Sections of coal bed in Miller Run mine.

Section.....	A	B	C	D	E
Laboratory No.....	W20440	W20441	W20442	W20443	W20447
Roof, sandstone and shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 7	0 5	.. ..	0 2	0 1 $\frac{1}{2}$
Coal, bony.....	<i>a</i> 0 9 $\frac{1}{2}$	.. ..	.. ..	.. ..	.. ..
"Sulphur".....	.. ..	.. ..	.. ..	0 1 $\frac{1}{2}$	.. ..
Coal.....	0 3 $\frac{1}{2}$	.. ..	.. ..	0 2 $\frac{1}{2}$	.. ..
Mother coal.....	0 $\frac{1}{4}$	.. ..	.. ..	.. ..	.. ..
"Sulphur" ball.....	.. ..	.. ..	.. ..	0 $\frac{1}{2}$	0 $\frac{1}{2}$
Coal.....	.. ..	.. ..	.. ..	0 1 $\frac{1}{2}$	0 5
Coal, bony.....	.. ..	<i>a</i> 0 10	<i>a</i> 1 4 $\frac{1}{2}$	<i>a</i> 0 9	<i>a</i> 0 8
Coal.....	1 2 $\frac{1}{2}$	1 3 $\frac{1}{2}$	1 2	1 5 $\frac{1}{2}$	1 4
"Sulphur".....	<i>a</i> 0 $\frac{1}{2}$	.. ..	.. ..	.. ..	.. ..
Coal, bony.....	.. ..	0 $\frac{3}{4}$	0 $\frac{1}{2}$	0 $\frac{3}{4}$	0 $\frac{1}{2}$
Coal.....	1 1 $\frac{1}{2}$	1 6 $\frac{1}{2}$	1 6 $\frac{1}{2}$	1 4	1 4
Floor, fire clay.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	4 1	4 1 $\frac{1}{2}$	4 1	4 1 $\frac{3}{8}$	3 11 $\frac{1}{2}$
Thickness of coal sampled.....	3 3	3 3 $\frac{3}{4}$	2 8 $\frac{1}{2}$	3 4 $\frac{3}{8}$	3 3 $\frac{1}{2}$

a Not included in sample.

Section A (sample W20440) was measured at the face of the main air course, 2,000 feet from the drift mouth.

Section B (sample W20441) was measured at the face of room 4, off the fifth right entry, 200 feet from the main entry.

Section C (sample W20442) was measured at the face of the first right entry, 200 feet off left entry 2.

Section D (sample W20443) was measured at the face of the second left entry, 500 feet off the main entry.

Section E (sample W20447) was measured on pillar of room 5, first left entry, 300 feet off the main entry.

A composite sample was made by mixing face samples W20440 to W20443. The results of an ultimate analysis of this sample are shown under laboratory No. 12371.

Notes.—At the time of sampling the coal was undercut by hand and shot down with FFF black powder. There were no screens, the entire output being shipped as run-of-mine. Pickers were employed on the cars in loading. There was one loading track at the tipple with a capacity of 8 empty and 8 loaded cars. The mine was equipped to produce 200 tons a day and had an average daily output of 100 tons, of which the larger part was from advance workings. The intent was to increase the output to 200 tons in the near future. There were 129 acres of unmined coal tributary to this opening.

HASTINGS. PENNSYLVANIA No. 11 AND No. 12 MINES.

Sample.—Bituminous coal; Windber field; analyses Nos. 12150 to 12157, inclusive, and 12166 to 12169, inclusive (pp. 76, 77).

Mines.—Pennsylvania No. 11 and Pennsylvania No. 12, drift mines in the central Pennsylvania district, 1 mile south of Hastings, on the Cresson division of the Pennsylvania Railroad.

Coal bed.—Lower Freeport or D, Carboniferous age, Allegheny formation. Average thickness, 4 feet 4 inches. Roof, dark shale, overlain by sandstone; floor, hard rough fire clay. Particles of the roof or floor did not become mixed with the coal in mining.

The bed was measured and sampled at five points in the No. 11 mine and at five points in the No. 12 mine by H. I. Smith, April 29, 1911, as described below:

Sections of coal bed in Pennsylvania No. 11 mine.

Section.....	A	B	C	D	E
Laboratory No.....	12150	12151	12166	12167	12169
Roof, shale and sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Shale.....	a 0 2½	a 0 2	a 0 2½	a 0 2	a 0 2
Coal.....	1 6	1 1	2 10	2 0	0 11
Mother coal and "sulphur".....	0 3	0 1	.. ..	.. ..	0 ½
Coal.....	2 8½	2 3	0 4	1 1	2 2½
"Mining slate" and coal.....	a 0 2½	a 0 1½	a 0 1	a 0 1½	a 0 2½
Coal.....	0 8	1 ½	0 7	0 3½	0 10½
Floor, fire clay.....					
Thickness of bed.....	5 3½	4 8½	4 ½	3 8	4 4½
Thickness of coal sampled.....	4 10½	4 4½	3 9	3 4½	4 ½

a Not included in sample.

Section A (sample 12150) was measured at the face of fifth right entry, off the main heading.

Section B (sample 12151) was measured at the face of the old main heading.

Section C (sample 12166) was measured at the face of the second right cross heading.

Section D (sample 12167) was measured at the face of left heading 3.

Section E (sample 12169) was measured on the pillar in room 16, off third left entry.

A composite sample was made by combining face samples 12150, 12151, 12166, and 12167. The results of an ultimate analysis of this sample are shown under laboratory No. 12168.

Sections of coal bed in Pennsylvania No. 12 mine.

Section.....	A	B	C	D	E
Laboratory No.....	12152	12153	12154	12155	12156
Roof, shale and sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Shale.....	.. ..	a 0 1	a 0 1½	a 0 1	a 0 2
Coal.....	2 6	0 8	3 2½	1 6	2 5
Coal, bony.....	.. ..	a 0 ½	.. ..	.. ..	a 0 1
Coal.....	.. ..	1 5	.. ..	.. ..	0 5
Mother coal and "sulphur".....	.. ..	0 ½	.. ..	0 ½	0 ½
Coal.....	.. ..	1 1½	.. ..	1 10½	0 5½
"Mining slate" and coal.....	a 0 1½	a 0 ½	a 0 2	a 0 1½	a 0 3
Coal.....	0 6	0 5	0 6	0 9½	0 5
Floor, fire clay.....					
Thickness of bed.....	3 1½	4 8	3 11½	4 4½	4 3
Thickness of coal sampled.....	3 0	3 10½	3 8½	4 2½	3 9

a Not included in sample.

Section A (sample 12152) was measured at the face of the original old main heading, 5,800 feet from the drift mouth.

Section B (sample 12153) was measured at the face of fifth entry, off the main heading.

Section C (sample 12154) was measured at the face of fourth right heading, 1½ miles from the drift mouth.

Section D (sample 12155) was measured at the face of room 1, off first entry off third right heading.

Section E (sample 12156) was measured at the face of third right entry, off the main heading.

A composite sample was made by combining face samples 12152 to 12156, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 12157.

Notes.—The system of mining in both mines is single entry, room-and-pillar. At the time of sampling the coal was undercut in the lower part of the bed by electric chain cutting machines and shot down with FFF and FFFF black powder. There was one loading track at the tippie with a capacity of 28 empty and 28 loaded cars. Pickers were employed on the cars in loading. The entire output of the mines was shipped as run-of-mine coal. The No. 11 mine was equipped to produce about 400 tons of coal a day and had a daily output of 325 tons. There was about 100 acres of coal tributary to this mine. The No. 12 mine was equipped to produce 300 tons a day. There was about 100 acres of coal tributary to this drift entry. All of the coal from these two mines was used for coking purposes. Both mines load over the same tippie.

JOHNSTOWN. VALLEY NO. 1 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12213, W19563, W19564, W19565, W19566, and W19567 (p. 77).

Mine.—Valley No. 1, a drift mine in the central Pennsylvania district, 3 miles south of Johnstown, on the Somerset & Cambria branch of the Baltimore & Ohio Railroad.

Coal bed.—C' or Upper Kittanning. Carboniferous age, Allegheny formation. Average thickness, 4 feet 2 inches. Roof, bony coal overlain with shale; floor, rough shale.

The bed was measured and sampled at five points in the mine by E. W. Miller on April 27, 1911, as described below:

Sections of coal bed in Valley No. 1 mine.

Section.....	A	B	C	D	E
Laboratory No.....	W19563	W19564	W19565	W19566	W19567
Roof, bony coal and shale.....	<i>Ft. in.</i> 1 4 $\frac{1}{2}$	<i>Ft. in.</i> 1 5	<i>Ft. in.</i> 0 2 $\frac{3}{4}$	<i>Ft. in.</i> 1 3 $\frac{1}{2}$	<i>Ft. in.</i> 0 5 $\frac{1}{2}$
Coal.....	0 0 1 $\frac{1}{2}$	0 1	0 2 $\frac{3}{4}$	0 0 3 $\frac{1}{2}$	0 1 $\frac{1}{2}$
Bone, shale, and "sulphur".....	2 7	2 8 $\frac{1}{2}$	3 6 $\frac{1}{2}$	2 9 $\frac{1}{2}$	3 3
Coal.....	.. ..	.. ..	.. ..	.. ..	0 0 1 $\frac{1}{2}$
Bone.....	.. ..	.. ..	.. ..	.. ..	0 7 $\frac{1}{2}$
Floor, shale.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	4 0	4 2	3 9 $\frac{3}{8}$	4 1 $\frac{1}{2}$	4 4 $\frac{1}{2}$
Thickness of coal sampled.....	3 11 $\frac{1}{2}$	4 2	3 9 $\frac{3}{8}$	4 1	4 3 $\frac{3}{8}$

a Not included in sample.

Section A (sample W19563) was measured at the face of room 11 in Andy's heading, 1,000 feet west of tippie No. 2.

Section B (sample W19564) was measured at the face of room 21, off left heading 7, 3,400 feet southeast of the drift mouth. There are small "sulphur" concretions in this section.

Section C (sample W19565) was measured on the chain pillar, 4,200 feet northeast of the drift mouth.

Section D (sample W19566) was measured at the face of room 4, off eighth right heading 3,600 feet southeast of the drift mouth.

Section E (sample W19567) was measured on the rib of the main air course, 150 feet beyond twelfth right heading.

A composite sample was made by mixing face samples W19563, W19564, W19566, and W19567. The results of an ultimate analysis of this sample are shown under laboratory No. 12213.

Notes.—At the time of sampling the coal was undercut by hand and shot down with black powder. There were two tipples; each tippie had one loading track with a capacity of 50 cars. There were no screens, the entire output being shipped as run-of-mine. Pickers were employed on the cars in loading. The mine had a capacity of about 1,500 tons a day with an average daily output of 1,200 tons, 90 per cent of which was from advance workings.

NANTY GLO. LINCOLN No. 1 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12180, 12181, 12182, 12183, 12184, and 12185 (p. 78).

Mine.—Lincoln No. 1, a drift mine in the central Pennsylvania district, 1 mile north of Nanty Glo on the Pennsylvania Railroad.

Coal bed.—Lower Kittanning, Miller, or B. Carboniferous age, Allegheny formation. Average thickness, about 3 feet 5 inches. The bed lies practically flat; the cleat is irregular. Roof, hard dark shale overlain by sandstone capping; floor, soft shale. All of the samples were taken at a depth of about 600 feet. There are occasionally small soft "sulphur" lenses in this coal. The bed was measured and sampled at five points in the mine by A. J. Hazlewood on May 3, 1911, as described below:

Sections of coal bed in Lincoln No. 1 mine.

Section.....	A	B	C	D	E
Laboratory No.....	12180	12181	12182	12183	12184
Roof, hard shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 9	0 10	0 10	0 11	0 10
Dull-coal binder.....	0 1	0 1½	0 2	0 2	0 2
Coal, soft and bright.....	2 6	2 5½	2 4	2 5	2 5
Floor, soft shale.....					
Thickness of bed.....	3 4	3 5	3 4	3 6	3 5
Thickness of coal sampled.....	3 4	3 5	3 4	3 6	3 5

Section A (sample 12180) was measured at the face of the new main heading.

Section B (sample 12181) was measured at the face of right entry 2

Section C (sample 12182) was measured at the face of right entry 4.

Section D (sample 12183) was measured at the face of left entry 7.

Section E (sample 12184) was measured at the face of left entry 9.

Notes.—The coal is mined by the room-and-pillar double-entry system. At the time of sampling the coal was undercut with electric chain-cutting machines and broken down with FFFF black powder. All of the coal was shipped as run-of-mine. The daily output was about 500 tons, practically all of which was from advance workings. The tippie is about 300 feet from the mouth of the mine. There were trackage facilities for handling about 40 cars.

NANTY GLO. SPRINGFIELD No. 1 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12128, 12129, 12130, 12131, 12132, and 12133 (pp. 78, 79).

Mine.—Springfield No. 1, a slope mine in the central Pennsylvania district, half a mile southeast of Nanty Glo on the Black Lick branch of the Cresson division of the Pennsylvania Railroad.

Coal bed.—Lower Kittanning or B. Carboniferous age, Allegheny formation. Average thickness, 3 feet 7 inches. Roof, firm shale, overlain by a sandstone cap rock 22 feet thick. Floor, a soft shale, generally smooth. Material from the roof or floor did not become mixed with the coal in mining. There are small soft "sulphur" lenses throughout the coal bed.

The bed was measured and sampled at five points in the mine by A. J. Hazlewood on April 29, 1911, as described below:

Sections of coal bed in Springfield No. 1 mine.

Section.....	A	B	C	D	E
Laboratory No.....	12128	12129	12130	12131	12133
Roof, sandrock, soft shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, soft, with irregular cleavage.....	0 11	0 11	1 0	1 0	0 10
Coal, dull.....	0 1	0 1	0 1½	0 1½	0 ¾
Coal, very soft with a number of soft "sulphur" lenses.....	2 4	2 8	2 5½	2 6½	2 10½
Floor, soft shale.....					
Thickness of bed.....	3 4	3 8	3 7	3 8	3 9
Thickness of coal sampled.....	3 4	3 8	3 7	3 8	3 9

Section A (sample 12128) was measured at the face of left entry 4, 2,700 feet from the mine mouth.

Section B (sample 12129) was measured at the face of the main entry, 3,500 feet from the mine mouth.

Section C (sample 12130) was measured at the face of the third crosscut off the dip heading, 2,500 feet from the mine mouth.

Section D (sample 12131) was measured at the face of left entry 1, 3,000 feet from the mine mouth.

Section E (sample 12133) was measured on the pillar in room 3, off left entry 2.

A composite sample was made by combining face samples 12128 to 12131, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 12132.

Notes.—The mine is on a syncline, and is entered by a steep slope 430 feet long. The bed is slightly rolling; there were three or four "swamps" on the main entry. The dip entry turns to the right and at the time of sampling had considerable water in it. The high parts of the mine were dry.

The coal was undercut in the bottom part of the bed with compressed air punchers and broken down with FFFF black powder. All of the coal was shipped as run-of-mine. Pickers were employed on the cars in loading. There was one loading track with a capacity of 20 empty and 20 loaded cars. The mine had a capacity of 550 tons with an average daily output of 500 tons, which was all from advance workings. There was approximately 2,000 acres of unmined coal tributary to this opening.

PORTAGE. FORGE SLOPE No. 1 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12369, W20396, W20397, W20398, W20399, W20400, and W20401 (p. 79).

Mine.—Forge Slope No. 1, a slope mine in the central Pennsylvania district, 2 miles north of Portage, on the Martins branch of the Pennsylvania Railroad.

Coal bed.—C' or Upper Kittanning, Carboniferous age, Allegheny formation. Average thickness, 3 feet 5 inches. The roof is bony coal of poor quality 1 foot 6 inches to 3 feet 4 inches thick, and is overlain by shale and sandstone. Floor, fire clay underlain by limestone.

The bed was measured and sampled at six points in the mine by P. M. Riefkin on June 8, 1911, as described below:

Sections of coal bed in Forge Slope No. 1 mine.

Section.....	A W20396	B W20397	C W20398	D W20399	E W20400	F W20401
Laboratory No.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, shale and bony coal.....						
Coal, soft.....	.. ..	.. ..	.. ..	0 5½	0 8	.. ..
"Sulphur".....	.. ..	.. ..	.. ..	0 ¼	0 ¼	.. ..
Coal.....	1 3½	1 2½	1 4	0 7	0 6	1 2¼
"Sulphur".....	.. ..	.. ..	.. ..	0 ¾	.. ..	.. ..
Coal.....	.. ..	.. ..	.. ..	0 3	.. ..	.. ..
Coal, hard.....	0 3	0 2½	0 2	0 1½	0 2½	0 2½
Coal.....	1 10¼	2 0	1 11½	2 2	2 1	2 2¼
Floor, fire clay.....						
Thickness of bed.....	3 4¾	3 5	3 5½	3 7¾	3 5¾	3 7
Thickness of coal sampled.....	3 4¾	3 5	3 5½	3 7¾	3 5¾	3 7

Section A (sample W20396) was measured near the face of the main south heading, 1 mile south of the mine mouth.

Section B (sample W20397) was measured on the rib near the face of left entry 7, off the main south entry, 1 mile west of the mine mouth.

Section C (sample W20398) was measured on the rib near the face of right entry 2, off left entry 7, off the main south entry, 4,500 feet northwest from the mine mouth.

Section D (sample W20399) was measured on the rib near the face of right entry 1, off left entry 7, off the main south heading, 5,000 feet southwest of the mine mouth.

Section E (sample W20400) was measured at the face of the main north heading, 3,000 feet north from the mine mouth.

Section F (sample W20401) was measured on the rib near the face of right entry 3, off the main north entry, 2,600 feet north from the mine mouth.

A composite sample was made by combining face samples W20396 to W20401, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 12369.

Notes.—At the time of sampling the coal was undercut with puncher machines and shot down with FFFF black powder. There were two loading tracks with a capacity of 45 empty and 45 loaded cars. There were no screens at the tippie, all of the coal being loaded as run-of-mine. Pickers were employed on the cars in loading. The mine had a capacity of 800 tons and a daily average output of 700 tons, the larger part of which was from advanced workings. The intent was to increase the output to 800 tons a day. There was approximately 300 acres of unmined coal tributary to this opening.

PORTAGE. MILLER No. 1 SHAFT.

Sample.—Semibituminous coal; Windber field; analyses Nos. 11355, 11356, 11357, 11358, 11359, and 11360 (p. 79).

Mine.—Miller No. 1 shaft; central Pennsylvania district; a shaft mine 1 mile south-east of Portage, on the main line of the Western Pennsylvania Division of the Pennsylvania Railroad. There are railroad connections from the mine to the main line.

Coal bed.—Lower Kittanning, Miller, or B. Carboniferous age, Allegheny formation. Average thickness, about 3 feet 6 inches. Dip, 5 to 15 per cent, west. Roof, hard black shale about 18 inches thick, above which is a sandstone cap rock; floor, medium-hard smooth clay. Cover at points of sampling, 200 to 425 feet. The bed was measured and sampled at five points in the mine by Charles Enzian on December 7, 1910, as described below:

Sections of coal bed in Miller No. 1 shaft.

Section.....	A	B	C	D	E
Laboratory No.....	11355	11356	11357	11358	11359
Roof, hard shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Bone.....	a 0 4 $\frac{3}{4}$	a 0 3 $\frac{3}{4}$	a 0 2 $\frac{3}{4}$	a 0 5 $\frac{3}{4}$	a 0 5 $\frac{3}{4}$
Coal.....	2 9 $\frac{1}{2}$	1 3 $\frac{3}{4}$	1 2	1 1	1 0
"Sulphur" band.....	0	0	0	0	0
Shale, hard.....	0	0	0	0	0
Coal.....	1 4 $\frac{3}{4}$	1 8 $\frac{3}{4}$	2 3 $\frac{3}{4}$	2 1	2 1
Mother coal.....	0	0	0	0	0
Coal.....	0 11 $\frac{1}{2}$	0 3 $\frac{3}{4}$	0 3 $\frac{3}{4}$	0 3 $\frac{3}{4}$	0 3 $\frac{3}{4}$
Floor, soft shale.....	0	0	0	0	0
Thickness of bed.....	3 2	3 11 $\frac{1}{2}$	3 5 $\frac{1}{2}$	3 10 $\frac{3}{4}$	3 6
Thickness of coal sampled.....	2 9 $\frac{1}{2}$	3 7 $\frac{3}{4}$	3 2 $\frac{3}{4}$	3 4 $\frac{3}{4}$	3 1 $\frac{1}{2}$

a Not included in sample.

Section A (sample 11355) was measured at the face of the second right dip, 2,800 feet southwest of the shaft.

Section B (sample 11356) was measured at the face of third left heading, 4,100 feet southeast of the shaft.

Section C (sample 11357) was measured on the pillar of the A-1 heading, 2,000 feet from the foot of the shaft.

Section D (sample 11358) was measured at the face of the first right dip, 1,500 feet from the foot of the shaft.

Section E (sample 11359) was measured at the face of first left heading, 3,000 feet from the foot of the shaft.

A composite sample was made by combining face samples 11355 to 11359, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 11360.

Notes.—The mine is opened by a shaft about 425 feet deep. The plan of working is triple entry, room-and-pillar. At the time of sampling the coal was undercut by hand. Black powder was used for breaking down the coal and dynamite for brushing the roof. The tippie was steel. There were two loading tracks with a capacity of 80 cars. All of the coal was shipped as run-of-mine. Pickers were employed on the cars in loading. The mine was comparatively new and had an average daily output of 700 tons, all of which was from advance workings. The intent was to increase the output to about 1,500 tons a day. When the pillars were pulled, the total recovery was about 90 per cent.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 160, 712, 713.

PORTAGE. PLYMOUTH No. 1 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 11705, W17110, W17111, and W17112 (p. 80).

Mine.—Plymouth No. 1, a drift mine in the central Pennsylvania district, 2½ miles east of Portage, on the Pennsylvania Railroad.

Coal bed.—C' or Upper Kittanning. Carboniferous age, Allegheny formation. Average thickness, 3 feet 8 inches. Roof, bony coal, overlain by shale. Floor, hard, smooth fire clay which softens readily when in contact with the air.

The bed was measured and sampled at three points in the mine by G. S. Pope on January 27, 1911, as described below:

Sections of coal bed in Plymouth No. 1 mine.

Section.....	A	B	C
	W17110	W17111	W17112
Laboratory No.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, bone and shale.....			
Coal.....	1 3	1 3	1 1
Bone.....	^a 0 ½	.. ..	^a 0 1½
Bone, soft.....	.. ..	0 1	.. ..
Coal.....	.. ..	0 8	.. ..
"Sulphur".....	.. ..	^a 0 ¼	.. ..
Coal.....	2 4	1 8	1 11½
Floor, fire clay.....			
Thickness of bed.....	3 7½	3 8½	3 1¾
Thickness of coal sampled.....	3 7	3 8	3 ½

^a Not included in sample.

Section A (sample W17110) was measured at the face of No. 5 dip, 300 feet from the main heading.

Section B (sample W17111) was measured at the face of fourth left entry, 2,000 feet from the main heading.

Section C (sample W17112) was measured at the face of the main heading, 250 feet from eighth left entry.

Notes.—At the time of sampling the coal was undercut by hand and shot down with FFFF black powder. The tippie had one loading track with a capacity of 15 cars. There were no screens, the entire output being shipped as run-of-mine. Pickers were employed on the cars in loading. The mine had a capacity of 300 tons a day and an average daily output of 250 tons. Plans were under way for installing rope haulage and doubling the production of the mine. There were approximately 750 acres of unmined coal tributary to this opening.

PORTAGE. SONMAN No. 2 SHAFT.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12205, 12217, W19688, W19689, W19690, W19691, W19692, W19693, and W19694 (p. 80).

Mine.—Sonman No. 2 shaft, in the central Pennsylvania district, 1 mile east of Portage, on the Sonman branch of the Pennsylvania Railroad.

Coal bed.—Lower Kittanning or B. Carboniferous age, Allegheny formation. Thickness, 3 feet 8 inches to 4 feet 6 inches, fairly uniform. Dip, $11\frac{1}{2}^{\circ}$ N., 68° W. Roof, smooth shale; above the shale is a sandstone cap rock; floor, rough fire clay. Particles of the roof or floor did not become mixed with the coal in mining.

The bed was measured and sampled at seven points in the mine by P. M. Riefkin on May 1, 1911, as described below.

Sections of coal bed in Sonman No. 2 shaft.

Section.....	A		B		C		D		E		F		G	
Laboratory No.....	W19688		W19689		W19690		W19691		W19692		W19693		W19694	
Roof, sandstone and shale.	Ft. in.		Ft. in.		Ft. in.		Ft. in.		Ft. in.		Ft. in.		Ft. in.	
Coal, bony.....	a	0 2½	a	0 4	a	0 6½	a	0 8	a	0 7	a	0 7½	a	0 5½
Coal.....	..	..	..	..	..	..	1	2½	..	..	1	5½	1	8½
Coal, bony.....	..	..	..	..	..	..	0	1¼	..	..	0	1¼	0	1
Coal.....	3	½	2	5	3	10	2	5	2	8½	1	8	0	7
"Sulphur" and mother coal.....	..	..	..	..	..	..	..	..	0	¼	0	¼	Streak.	
Coal, hard.....	..	..	1	2	..	..	..	..	0	8	0	7½	1	6
Coal.....	..	..	..	..	..	..	..	..	0	8	0	7½	1	6
Floor, fire clay.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Thickness of bed.....	3	3	3	11	4	4½	4	3½	3	11½	4	5	4	4
Thickness of coal sampled..	3	½	3	7	3	10	3	7¼	3	4¾	3	9½	3	10½

a Not included in sample.

Section A (sample W19688) was measured at the face of room 8, left heading 2 off dip off the main south heading.

Section B (sample W19689) was measured on a pillar near the face of room 23, first right off plane, 3,000 feet southeast of the shaft.

Section C (sample W19690) was measured at the face of room 13, left heading 1 off dip off the main south heading.

Section D (sample W19691) was measured at the face of "No. 32 crook" off the main north heading.

Section E (sample W19692) was measured at the face of "No. 28 crook," left heading 1 off dip off main south heading.

Section F (sample W19693) was measured at the face of room 10, first right off plane 17 off main north heading.

Section G (sample W19694) was measured at the face of right heading 3 off main dip off main north heading.

A composite sample was made by combining face samples W19689, W19691, and W19692. The results of an ultimate analysis of this sample are shown under laboratory No. 12217.

A composite sample was made by combining face samples W19688, W19690, W19693, and W19694. The results of an ultimate analysis of this sample are given under laboratory No. 12205.

Notes.—The mine is opened by a shaft 320 feet deep. At the time of sampling the coal was undercut by hand and broken down with black powder. The entire output was shipped as run-of-mine. Pickers were employed on the car in loading. There were two loading tracks with a capacity of 55 empty and 55 loaded cars. The daily output was 1,100 tons, about 75 per cent of which was from advance workings. There was approximately 1,500 acres of unmined coal tributary to this opening.

SPANGLER. PENNSYLVANIA NO. 21 AND NO. 22 MINES.

Sample.—Bituminous coal; Windber field; analyses Nos. 12126, 12127, 12140 to 12148, inclusive (p. 81).

Mine.—Pennsylvania No. 21 and Pennsylvania No. 22, slope mines, 2 miles northwest of Spangler, on the Cresson division of the Pennsylvania Railroad.

Coal bed.—Lower Freeport or D, Carboniferous age, Allegheny formation. Average thickness, 3 feet 10 inches. Roof, bony coal overlain by "draw slate" 6 inches thick, which comes down with the coal. Floor, hard fire clay with rough surface. In mining care was taken that the material from the roof and floor did not become mixed with the coal.

The bed was measured and sampled at five points in No. 22 mine and at four points in No. 21 mine by H. I. Smith, on April 26 and 27, 1911, as described below:

Sections of coal bed in Pennsylvania No. 21 mine.

Section.....	A 12144	B 12145	C 12146	D 12147
Laboratory No.....				
Roof, bony coal, and "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 4½	0 4	0 4	0 4
Coal and "shale".....	0 4½	0 1	0 1	0 1
Coal.....	1 0	0 8½	0 5	1 3
Coal and "sulphur".....	0 0	0 1½	0 2	0 0
Coal.....	0 0	0 4½	0 3½	0 6
Coal.....	0 0	0 1	0 2½	0 1
Bony coal.....	0 1½	0 1	0 1½	0 1
Coal.....	0 1	0 1½	0 0	0 10
Coal.....	1 4	1 1	1 0	0 10
Coal.....	0 0	0 3	0 1	0 0
"Mining slate".....	0 0	0 1½	0 1½	0 1
Coal.....	0 1	0 1	0 1	0 0
Coal.....	0 10	0 8	0 8	0 9
Floor, hard fire clay.				
Thickness of bed.....	3 9	3 5½	3 6	3 7½
Thickness of coal sampled.....	3 7	2 10	2 8½	3 5

α Not included in sample.

Section A (sample 12144) was measured at the face of the main heading, 5,000 feet southwest of the mine mouth.

Section B (sample 12145) was measured at the face of the second main entry, 6,500 feet from the mine mouth.

Section C (sample 12146) was measured at the face of back heading 17. The point of sampling was 5,900 feet west of the mine mouth.

Section D (sample 12147) was measured at the face of right entry 4 off the second main entry, 6,300 feet east of the mine mouth.

A composite sample was made by combining face samples 12144 to 12147, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 12148.

Sections of coal bed in Pennsylvania No. 22 mine.

Section.....	A 12126	B 12127	C 12140	D 12141	E 12142
Laboratory No.....					
Roof, cannel coal and "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 8	1 5½	0 11	0 10	0 4½
Mother coal and "sulphur".....	α 0 ½	0 0	0 1	α 0 ½	0 1½
Coal.....	1 3½	0 0	0 6½	0 0	0 7½
Mother coal and "sulphur".....	0 0	0 0	0 0	0 0	α 0 1½
Coal.....	0 0	0 0	0 0	0 0	0 3
Coal gray, bony.....	0 ½	α 0 1½	0 1½	0 0	α 0 1½
Coal.....	0 9	1 1	1 2½	1 7½	1 0
Coal.....	α 0 1	α 0 1	α 0 ½	α 0 1	0 0
"Mining slate".....	α 0 1	α 0 1	α 0 1	α 0 1½	α 0 ½
Coal.....	α 0 1½	α 0 1	α 0 1	α 0 1	0 0
Coal.....	1 0	1 0	1 0	0 8½	0 10
Floor, hard fire clay.					
Thickness of bed.....	4 1	3 11	3 11½	3 5½	3 3
Thickness of coal sampled.....	3 9	3 7½	3 9½	3 2	3 1½

α Not included in sample.

Section A (sample 12126) was measured at the face of the main ninth entry, 7,200 feet southwest of the mine mouth.

Section B (sample 12127) was measured on the rib of room 9, right entry 4, off the main ninth entry, 6,200 feet southwest of the mine mouth.

Section C (sample 12140) was measured at the face of room 17, off right entry 6, off the main ninth entry, 7,400 feet from the mine mouth.

Section D (sample 12141) was measured at the face of the main back heading, 7,100 feet from the mine mouth.

Section E (sample 12142) was measured at the face of the fourteenth right off the main heading, 7,200 feet from the mine mouth.

A composite sample was made by combining face samples 12126, 12127, 12140, 12141, and 12142. The results of an ultimate analysis of this sample are given under laboratory No. 12143.

Notes.—At the time of sampling the coal was undercut both by hand and with electric chain machines and shot down with FFFF black powder and "40 per cent" nitroglycerin dynamite. There was one loading track at the tippie with a capacity of 50 empty and 100 loaded cars. All of the coal was shipped as run-of-mine. The tippie was equipped with bar screens with 3-inch openings; if screened about 50 per cent of the coal would pass through the 3-inch spaces. Pickers were employed on the cars in loading. The capacity of the storage bin was 165 tons. The mines had a capacity of 1,500 tons a day, with a daily average output of 1,000 tons, 60 per cent of which was from advance workings. There was approximately 5,000 acres of unmined coal tributary to this opening.

TWIN ROCKS. BIG BEND NO. 1 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. W19668, W19669, W19672, W19674, W19676, 12208, and 12215 (p. 82).

Mine.—Big Bend No. 1, a drift mine in Black Lick Township at Twin Rocks, on the Cresson division of the Pennsylvania Railroad.

Coal bed.—Miller, B, or Lower Kittanning. Carboniferous age, Allegheny formation. Average thickness, 3 feet 8 inches. Roof, smooth, hard, gray shale 15 feet thick, overlain with sandstone. Floor, hard, smooth shale, underlain with fire clay.

The bed was measured and sampled at five points in the mine by E. W. Miller on April 29, 1911, as described below:

Sections of coal bed in Big Bend No. 1 mine.

Section.....	A W19668 Fl. in.	B W19669 Fl. in.	C W19672 Fl. in.	D W19674 Fl. in.	E W19676 Fl. in.
Roof, sandstone and shale.	3 7½	1 11	1 9	0 3½	4 3
Coal.....	.. ..	0 ½	.. ..	.. ..	.. ..
"Sulphur".....	.. ..	0 5	.. ..	.. ..	.. ..
"Coal".....	.. ..	0 ½	a 0 ½	a 0 ½	.. ..
"Sulphur" and shale.....	.. ..	1 2½	1 9½	3 3½	.. ..
Floor, shale and fire clay.	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 7½	3 6½	3 7½	3 7½	4 3
Thickness of coal sampled.....	3 7½	3 6½	3 6½	3 7	4 3

a Not included in sample.

Section A (sample W19668) was measured at the face of room 11 off the drainage heading, 2,600 feet northeast of the main opening.

Section B (sample W19669) was measured at the face of the water-level heading 2,000 feet northeast of the main opening.

Section C (sample W19672) was measured on the pillar opposite room 16, Claghorn section, 3,000 feet east of the main opening.

Section D (sample W19674) was measured on the pillar to left of main heading, 2,500 feet east of the main opening.

Section E (sample W19676) was measured on the pillar to the left of the main heading, opposite right headings 6 and 7, 2,000 feet east of the main opening.

A composite sample was made by combining face samples W19668 and W19669. The results of an ultimate analysis of this sample are shown under laboratory No. 12215.

A composite sample was made by combining face samples W19672, W19674, and W19676. The results of an ultimate analysis of this sample are shown under laboratory No. 12208.

Notes.—At the time of sampling, the coal was undercut by hand and broken down with black powder. There was no screen, the entire output being shipped as run-of-mine. Pickers were employed on the cars in loading. There was one loading track with a capacity of 10 cars. The mine had a daily capacity of 450 tons, with an average output of 375 tons a day, 70 per cent of which was from advance workings.

TWIN ROCKS. BIG BEND NO. 6 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. W19670, W19671, W19673, W19675, W19677, 12707, and 12227 (p. 83).

Mine.—Big Bend No. 6, a drift mine in Black Lick Township, 1 mile north of Twin Rocks, on the Cresson division of the Pennsylvania Railroad.

Coal bed.—Miller, B, or Lower Kittanning. Carboniferous age, Allegheny formation. Average thickness, 5 feet 9 inches. The roof, a hard, smooth gray shale, 15 feet thick, is overlain by a sandstone cap rock 25 feet thick. The floor is a hard, smooth shale; below the shale is a fire clay.

The bed was measured and sampled at five points in the mine by E. W. Miller on April 29, 1911, as described below:

Sections of coal bed in Big Bend No. 6 mine.

Section.....	A	B	C	D	E
Laboratory No.....	W19670	W19671	W19673	W19675	W19677
Roof, shale and sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 1½	0 3¼	2 1½	.. ..	0 ¾
"Sulphur" streak.....	a 0 ¼	a 0 ¾	a 0 1½	.. ..	.. ¼
Shale.....	.. ..	.. ..	.. ..	.. ..	a 0 ¼
Coal.....	3 7¾	3 4½	1 7	3 9½	3 7½
Floor, shale and fire clay.	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 9½	3 7¾	3 9¾	3 9½	3 8½
Thickness of coal sampled.....	3 9¼	3 7¾	3 8¼	3 9½	3 8¼

a Not included in sample.

Section A (sample W19670) was measured at the face of room 1, left side of right heading 1 off No. 9 drift, 900 feet south of No. 9 opening. There were sulphur streaks in the coal represented by this section.

Section B (sample W19671) was measured on the pillar between rooms 23 and 24 off the main heading, 1,500 feet northeast of the main opening. There were irregular sulphur streaks in the coal represented by this section.

Section C (sample W19673) was measured at the face of heading 13, 325 feet from the outcrop and 3,500 feet southeast of the main opening. There were sulphur streaks throughout the coal represented by this section.

Section D (sample W19675) was measured on the pillar between rooms 27 and 28 off the main heading, 2,000 feet northeast of the main opening. There were small irregular sulphur streaks in the coal represented by this section.

Section E (sample W19677) was measured at the face of room 10 on the left side of No. 9 drift, 700 feet southwest of No. 9 opening. Sulphur balls and streaks were frequent in the coal represented by this section.

A composite sample was made by combining face samples W19671 and W19675. The results of an ultimate analysis of this sample are shown under laboratory No. 12207.

Notes.—At the time of sampling the coal was undercut by hand and shot down with black powder. There was one loading track at the tippie with a capacity of 16 cars. There were no screens, the entire output being loaded as run-of-mine. Pickers were employed on the cars in loading. The mine had a daily capacity of 450 tons and an average daily output of 375 tons, of which about 70 per cent was from advance workings.

TWIN ROCKS. COMMERCIAL NO. 3 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12377, W20477, W20478, W20479, W20480, and W20481 (p. 83).

Mine.—Commercial No. 3, a slope mine at Twin Rocks, on the Cresson division of the Pennsylvania Railroad.

Coal bed.—Miller or B. Carboniferous age, Allegheny formation. Average thickness, 3 feet 9 inches. The roof, a black shale 5 to 8 feet thick, is overlain by sandstone. The floor is shale and bottom coal, underlain by fire clay.

The bed was measured and sampled at five points in the mine by E. W. Miller on June 10, 1911, as described below:

Sections of coal bed in Commercial No. 3 mine.

Section.....	A		B		C		D		E	
Laboratory No.....	W20477		W20478		W20479		W20480		W20481	
Roof, sandstone and shale.....	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Coal.....	0	5½	0	1	0	5½	0	1	0	7½
“Sulphur” streak.....	..	..	0	½	0	½	0	½	0	½
“Sulphur” ball.....	a	1 2	..	..	..	..	..	..	..	..
Coal.....	3	4½	1	9½	2	0	2	1½	3	½
“Sulphur”.....	..	..	a	0	a	0	0	½	..	..
Coal.....	..	..	1	6½	0	5½	0	4½	..	..
“Sulphur”.....	..	..	..	..	a	0	0	½	..	..
Coal.....	..	..	..	..	0	5½	..	..	..	..
“Sulphur”.....	..	..	..	..	0	1½	1	4	..	..
Floor, shale, bottom coal, and fire clay.....	..	..	..	..	..	..	..	..	..	..
Thickness of bed.....	5	½	3	6	3	6½	3	11½	3	8½
Thickness of coal sampled.....	3	10½	3	5½	3	6	3	11½	3	8½

a Not included in sample.

Section A (sample W20477) was measured at the face of the main heading, 6,200 feet northwest of the mine mouth.

Section B (sample W20478) was measured on the pillar of fourth right heading, 5,000 feet from the main entry and 4,500 feet northeast of the mine mouth.

Section C (sample W20479) was measured at the face of seventh right heading, 450 feet from the main entry and 5,600 feet northwest of the mine mouth.

Section D (sample W20480) was measured at the face of seventh left entry, 700 feet from the main entry and 5,300 feet northwest of the mine mouth.

Section E (sample W20481) was measured at the face of fifth right heading, 5,000 feet from the main entry and 4,200 feet north of the mine mouth.

A composite sample was made by combining face samples W20477, W20479, W20480, and W20481). The results of an ultimate analysis of this sample are given under laboratory No. 12377.

Notes.—At the time of sampling the coal was undercut by hand and with machines and shot down with FFF black powder. There was one loading track at the tippie which had a capacity of 28 empty and 28 loaded cars. There were no screens, the entire output being shipped as run-of-mine. Pickers were employed on the cars in loading. The mine was equipped to produce about 1,000 tons a day and was operating at full capacity. There was approximately 850 acres of unmined coal tributary to this opening.

TWIN ROCKS. COMMERCIAL NO. 4 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12364, W17061, W20501, W20503, W20505, W20506, W20508 (p. 83).

Mine.—Commercial No. 4, a slope mine near Twin Rocks, on the Cresson division of the Pennsylvania Railroad.

Coal bed.—Lower Kittanning or B. Carboniferous age, Allegheny formation. Average thickness, 3 feet 9 inches. Roof, a black shale 5 to 8 feet thick, above which is a sandstone cap rock. Floor, shale, underlain by fire clay.

The bed was measured and sampled at five points in the mine by P. M. Riefkin on June 12, 1911 and at one point by G. S. Pope on January 26, 1911, as described below:

Sections of coal bed in Commercial No. 4 mine.

Section.....	A	B	C	D	E	F
Laboratory No.....	W20501	W20503	W20505	W20506	W20508	W17061
Roof, sandstone and shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 4	2 1	2 0	2 0	1 11½	0 6
"Sulphur".....	0 ¾	0 ½	0 ½	0 ½	α 0 ½	0 ½
Coal.....	.. ..	.. ..	0 3½	.. ..	.. ..	.. ..
"Sulphur".....	.. ..	.. ..	0 ½	.. ..	.. ..	.. ..
Coal.....	.. ..	.. ..	0 2½	.. ..	.. ..	.. ..
Mother coal.....	.. ..	.. ..	0 ½	.. ..	.. ..	.. ..
Coal.....	1 3½	1 3½	1 2	1 10½	1 7½	3 1½
Floor, shale and fire clay.						
Thickness of bed.....	3 8	3 4¾	3 8¾	3 10¾	3 7½	3 7½
Thickness of coal sampled.....	3 8	3 4¾	3 8¾	3 10¾	3 7	3 7½

α Not included in sample.

Section A (sample W20501) was measured 100 feet from the face of the main heading, 5,200 feet north of the mine mouth.

Section B (sample W20503) was measured on the sixth pillar of east entry 9 off right entry 2 off the main entry, 3,800 feet northeast of the mine mouth.

Section C (sample W20505) was measured at the face of east entry 6 off right entry 3 off the main entry, 4,000 feet northeast of the mine mouth.

Section D (sample W20506) was measured on the rib near the face of east entry 7 off right entry 3 off the main entry, 4,800 feet northeast of the mine mouth.

Section E (sample W20508) was measured at the face of right entry 3 off the main entry, 4,900 feet northeast of the mine mouth.

Section F (sample W17061) was measured at the face of the third main entry off No. 4 slope.

A composite sample was made by combining face samples W20501, W20505, W20506, and W20508. The results of an ultimate analysis of this sample are shown under laboratory No. 12364.

Notes.—At the time of sampling the coal was undercut both by hand and with machines and broken down with FFF black powder. There were no screens, the entire output being shipped as run-of-mine. Pickers were employed on the cars in loading. There was one loading track with a capacity of 26 empty and 26 loaded cars. The capacity of the mine was 600 tons a day with an average daily output of 450 tons. There were approximately 850 acres of unmined coal.

TWIN ROCKS. COMMERCIAL NO. 5 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12375, W17062, W20499, W20500, W20502, W20504, and W20507 (p. 84).

Mine.—Commercial No. 5, a slope mine 1 mile from Twin Rocks, on the Cresson division of the Pennsylvania Railroad.

Coal bed.—Miller or B. Carboniferous age, Allegheny formation. Average thickness, 3 feet 10 inches. Roof, shale 3 to 15 feet thick, overlain by a sandstone cap rock; floor, shale underlain with fire clay.

The bed was measured and sampled at five points in the mine by E. W. Miller on June 12, 1911, and at one point in the mine by P. M. Riefkin on January 26, 1911, as described below:

Sections of coal bed in Commercial No. 5 mine.

Section.....	A	B	C	D	E	F
Laboratory No.....	W17062	W20499	W20500	W20502	W20504	W20507
Roof, sandstone and shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 10	0 11½	0 4½	1 11	0 1½	1 2
"Sulphur".....	a 0 ½	0 ½	a 0 ½	a 0 ½	a 0 ½	.. ..
Coal.....	.. ..	1 ½	0 5½	.. ..	0 2½	.. ..
"Sulphur".....	.. ..	0 ½	0 ½	.. ..	a 0 ½	0 ½
Coal.....	.. ..	0 5½	1 5	.. ..	1 1½	1 2½
"Sulphur".....	.. ..	0 ½	a 0 ¾	.. ..	0 ½	.. ..
Coal.....	.. ..	0 1½	1 2	.. ..	0 7½	.. ..
"Sulphur".....	.. ..	0 ½	a 0 1	.. ..	a 0 ½	0 ½
Coal.....	2 9½	1 0	.. ..	1 9	1 5½	1 3½
Floor, shale and fire clay.						
Thickness of bed.....	3 8	3 7½	3 7½	3 8½	3 7½	3 8½
Thickness of coal sampled.....	3 7½	3 7½	3 5¼	3 8	3 6¾	3 8¼

a Not included in sample.

Section A (sample W17062) was measured at the face of room 1 off east heading 10 off the main entry.

Section B (sample W20499) was measured at the face of the main heading; 4,700 feet northeast of the mine mouth.

Section C (sample W20500) was measured at the face of room 7 off right heading 1; 500 feet from the second parallel entry and 3,400 feet northeast of the mine mouth.

Section D (sample W20502) was measured at the face of east heading 12; 325 feet from the main entry and 4,700 feet northeast of the mine mouth.

Section E (sample W20504) was measured at the face of east heading 11; 800 feet from the main entry and 4,000 feet northeast of the mine mouth.

Section F (sample W20507) was measured at the face of room 10 off east heading 10; 750 feet from the main heading and 3,900 feet northeast of the mine mouth.

A composite sample was made by combining face samples W20499, W20500, W20502, W20504, and W20507. The results of an ultimate analyses of this sample are shown under laboratory No. 12375.

Notes.—At the time of sampling the coal was undercut by hand and shot down with FFF black powder. There were no screens, the entire output being shipped as run-of-mine coal. Pickers were employed on the cars in loading. There was one loading track at the tippie with a capacity of 28 empty and 28 loaded cars. The mine was equipped to produce 500 tons a day and had an average daily output of 300 tons. An increase to 800 tons was contemplated.

CENTER COUNTY.

OSCEOLA MILLS. ELECTRIC MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12067, 12068, 12069, 12070, and 12190 (p. 84).

Mine.—Electric, a drift mine, one-half mile south of Osceola Mills on the Pennsylvania Railroad.

Coal bed.—Lower Kittanning or B. Carboniferous age, Allegheny formation. Average thickness, 5 feet. Roof, smooth shale; above the shale is a cap rock about 15 feet thick. Floor, smooth hard fire clay.

The bed was measured and sampled at four points in the mine by P. M. Riefkin on April 18, 1911, as described on the following page.

Sections of coal bed in Electric mine.

Section.....	A	B	C	D
Laboratory No.....	12067	12068	12069	12070
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Top coal.....	a 0 1 $\frac{1}{2}$	a 0 1	a 0 1	a 0 1
Coal.....	0 9 $\frac{1}{2}$	0 9	0 8 $\frac{1}{2}$	0 6
Sulphur, soft.....	.. ..	0 $\frac{1}{4}$	0 $\frac{1}{4}$	0 $\frac{1}{4}$
Coal.....	.. ..	0 4 $\frac{1}{2}$	0 4	0 4 $\frac{1}{2}$
Coal, hard.....	a 0 3	a 0 2	a 0 2 $\frac{1}{2}$	a 0 4
Coal, bony.....	a 0 4	a 0 3	a 0 4	a 0 3 $\frac{1}{2}$
Coal.....	1 11 $\frac{1}{4}$	1 9	1 8	1 7 $\frac{1}{2}$
"Sulphur" streaks, soft.....	.. ..	0 $\frac{1}{2}$	.. ..	.. ..
Coal.....	.. ..	0 2 $\frac{1}{2}$	.. ..	.. ..
"Sulphur".....	0 $\frac{1}{4}$	a 0 $\frac{1}{2}$	a 0 1	a 0 $\frac{1}{2}$
Coal.....	.. ..	0 5	.. ..	.. ..
"Sulphur".....	.. ..	a 0 $\frac{1}{2}$	.. ..	.. ..
Coal.....	1 0	0 7	1 2 $\frac{3}{4}$	1 3
Bottom coal.....	a 0 4 $\frac{1}{2}$	a 0 5 $\frac{1}{2}$	a 0 3	a 0 4
Floor, hard fire clay.....	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	4 10	5 2 $\frac{3}{4}$	4 10 $\frac{3}{4}$	4 10 $\frac{1}{4}$
Thickness of coal sampled.....	3 9	4 1 $\frac{3}{4}$	3 11 $\frac{1}{4}$	3 9 $\frac{1}{4}$

a Not included in sample.

Section A (sample 12067) was measured at the face of right entry 1, off the new drift entry.

Section B (sample 12068) was measured on the pillar at room 9, off left entry 5, off the main entry.

Section C (sample 12069) was measured on the pillar at room 7, off right entry 4, off the main heading.

Section D (sample 12070) was measured on the pillar at room 5, off left entry 5, off the main heading.

A composite sample was made by combining face samples 12068, 12069, and 12070. The results of an ultimate analysis of this sample are shown under laboratory No. 12190.

Notes.—At the time of sampling the coal was undercut and then broken down with FFFF black powder. All of the coal was shipped as run-of-mine. Pickers were employed on the cars in loading. There was one loading track with a capacity of 20 empty and 15 loaded cars. The mine had a capacity of 400 tons a day; the average output was about 300 tons, 80 per cent of which was from pillars and 20 per cent from advance workings. There were approximately 200 acres of pillars to be taken out through this opening.

OSCEOLA MILLS. MOSHANNON No. 10 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12057, 12058, 12059, 12060, 12061, and 12062 (p. 85).

Mine.—Moshannon No. 10, a drift mine in the Clearfield district one-fourth of a mile north of Osceola Mills on the Pennsylvania Railroad.

Coal bed.—Lower Kittanning or B. Carboniferous age, Allegheny formation. Thickness, 3 $\frac{1}{2}$ to 6 feet, average, 5 feet. Roof, smooth shale; floor, hard fire clay.

The bed was measured and sampled at five points in the mine by P. M. Riefkin on April 18, 1911, as described below:

Sections of coal bed in Moshannon No. 10 mine.

Section.....	A	B	C	D	E
Laboratory No.....	12057	12058	12059	12060	12061
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Top coal.....	0 1	a 0 $\frac{1}{2}$	.. ..	.. ..	a 0 2
Coal.....	0 6	0 6 $\frac{1}{2}$	0 8 $\frac{1}{2}$	0 7	0 3 $\frac{1}{4}$
Coal, hard (gray).....	a 0 4	a 0 4	a 0 2 $\frac{1}{2}$	a 0 2 $\frac{1}{2}$	a 0 3 $\frac{1}{2}$
Coal, bony.....	a 0 6	a 0 3 $\frac{1}{2}$	a 0 4 $\frac{1}{2}$	a 0 3	a 0 4 $\frac{1}{2}$
Coal.....	1 5	2 $\frac{1}{2}$	1 9	1 8	1 6 $\frac{1}{2}$
"Sulphur".....	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$	0 $\frac{1}{2}$	a 0 $\frac{1}{4}$	.. ..
Coal.....	0 11	0 10 $\frac{1}{2}$	0 5	1 0	.. ..
"Sulphur".....	a 0 1	.. ..	a 0 $\frac{1}{2}$	.. ..	a 0 $\frac{1}{2}$
Coal.....	0 6 $\frac{1}{2}$	.. ..	0 4 $\frac{1}{2}$	.. ..	0 4 $\frac{1}{2}$
Bottom coal.....	0 2	0 3	0 4 $\frac{1}{2}$	.. ..	0 4 $\frac{1}{2}$
Floor, fire clay.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	4 6 $\frac{3}{4}$	4 5	4 3 $\frac{3}{4}$	3 8 $\frac{3}{4}$	3 5 $\frac{1}{4}$
Thickness of coal sampled.....	3 7 $\frac{1}{2}$	3 8 $\frac{1}{2}$	3 8 $\frac{1}{4}$	3 3	2 6 $\frac{1}{4}$

a Not included in sample.

Section A (sample 12057) was measured on the rib of room 18, 40 feet from left entry 2, off right entry 4.

Section B (sample 12058) was measured at the face of room 21, off the left main heading.

Section C (sample 12059) was measured at the face of room 16, off the right main heading, near the first crosscut to the right.

Section D (sample 12060) was measured at the face of right heading 1.

Section E (sample 12061) was measured at the face of room 16, off right heading 2.

A composite sample was made by combining face samples 12057 to 12061. The results of an ultimate analysis of this sample are given under laboratory No. 12062.

Notes.—At the time of sampling the coal was undercut by electric cutting machines and shot down with FFFF black powder. About 90 per cent of the output was shipped as run-of-mine coal, the machine cuttings, which amounted to about 10 per cent of the output, being loaded separately. Pickers were employed on the cars in loading. There was one loading track with a capacity of 25 empty and 15 loaded railroad cars. The mine was equipped to produce 700 tons a day and had an average daily output of 500 tons, about 75 per cent of which was from advance workings. An increase of about 50 per cent in the output was contemplated. There was approximately 600 acres of unmined coal tributary to this opening.

OSCEOLA MILLS. WESTON MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12063, 12064, and 12065 (p. 85).

Mine.—Weston, a drift mine in the Clearfield district, one-half mile south of Osceola Mills, on the Pennsylvania Railroad.

Coal bed.—Lower Kittanning or B. Carboniferous age, Allegheny formation. Average thickness, 5 feet. Roof, smooth black shale; floor, hard smooth fire clay. Neither roof nor floor material got mixed with the coal in mining.

The bed was measured and sampled at three points in the mine by P. M. Riefkin on April 18, 1911, as described below:

Sections of coal bed in Weston mine.

Section.....	A	B	C
Laboratory No.....	12063	12064	12065
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Top coal.....			
Coal.....	0 9½	1 2	1 4
"Sulphur".....	a0 1	.. ..	a0 1
Coal.....	0 4½	.. ..	.. ..
Coal, bony (gray).....	a0 2	a0 1	a0 1
Coal, bony.....	a0 4	a0 4	a0 4
Coal, gray.....	a0 1½	.. ..	.. ..
Coal.....	2 5½	2 11	3 3
"Sulphur".....	.. ..	a0 ½	.. ..
Coal.....	.. ..	0 3	.. ..
Bottom coal.....	a0 2½	a0 3	a0 2
Floor, hard fire clay.....			
Thickness of bed.....	4 5¾	5 1½	5 3
Thickness of coal sampled.....	3 7½	4 4	4 7

a Not included in sample.

Section A (sample 12063) was measured at the face of left entry 4, off the main entry.

Section B (sample 12064) was measured on the rib of the main heading at left entry 7.

Section C (sample 12065) was measured on a pillar at room 8, off right entry 1, off the main heading.

A composite sample was made by combining face samples 12063 and 12064. The results of an ultimate analysis of this sample are shown under laboratory No. 12066.

Notes.—At the time of sampling the coal was undercut by hand and broken down with FFFF black powder. All of the coal was shipped as run-of-mine. Pickers were

employed on the cars in loading. There was one loading track with a capacity of 20 empty and 15 loaded cars. The mine had a capacity of 400 tons and a daily average output of 200 tons. Approximately 400 acres of unmined coal was to be developed from a new opening on this property.

CLEARFIELD COUNTY.

BOARDMAN. POTTS RUN NO. 3 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12093, 12094, 12095, 12096, 12097, and 12098 (pp. 85, 86).

Mine.—Potts Run No. 3, a drift mine in the Clearfield district, 1 mile west of Boardman, on the New York Central Railroad.

Coal bed.—Lower Kittanning or B. Carboniferous age, Allegheny formation. Average thickness, 3 feet 10 inches. Roof, shale; floor, fire clay.

The bed was measured and sampled at five points in the mine by P. M. Riefkin on April 24, 1911, as described below:

Sections of coal bed in Potts Run No. 3 mine.

Section.....	A		B		C		D		E	
Laboratory No.....	12093		12094		12095		12096		12097	
Roof, draw shale.....	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Coal.....	..	..	..	..	..	..	a 0	1½	0	3½
Sulphur.....	..	..	..	..	..	..	..	..	..	Streak.
Coal.....	2	3	2	2½	2	2	2	3	1	11
Bony coal to shale.....	a 0	1	a 0	1	a 0	½	a 0	1	a 0	1½
Coal, gray.....	0	2½	..	..	..	..	..	..	..	..
Coal.....	1	1	1	5	1	4	1	6	1	3¼
Floor, fire clay.....	..	..	..	..	..	..	..	..	..	..
Thickness of bed.....	3	7½	3	7¾	3	6½	3	11½	3	7¼
Thickness of coal sampled.....	3	6½	3	7¼	3	6	3	9	3	5¾

a Not included in sample.

Section A (sample 12093) was measured at the face of right entry 3, off the main entry, 1,400 feet southwest of the mine mouth.

Section B (sample 12094) was measured 10 feet from the face on the rib of right entry 4, off the main entry, 1,700 feet southwest of the mine mouth.

Section C (sample 12095) was measured at the face of left entry 3, off the main entry, 1,680 feet northeast of the mine mouth.

Section D (sample 12096) was measured at the face of the main heading, 2,000 feet north of the mine mouth.

Section E (sample 12097) was measured at the face of room 12, off right entry 2, off the main entry.

A composite sample was made by combining face samples 12093 to 12097, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 12098.

Notes.—At the time of sampling the coal was undercut by hand and broken down with FFFF black powder. Dynamite was used for brushing the roof and floor. There was one loading track with a capacity of 18 empty and 15 loaded cars. Pickers were employed on the car in loading. The mine had a capacity of 550 tons a day.

BRISBIN. LENORE NO. 1 AND NO. 2 MINES.

Sample.—Bituminous coal; Windber field; analyses Nos. 12044, 12045, 12046, and 12047 (p. 86).

Mines.—Lenore No. 1 and Lenore No. 2, drift mines in the Clearfield district, 1 mile southwest of Brisbin, on the Pennsylvania Railroad.

Coal bed.—Upper Freeport or E. Carboniferous age, Allegheny formation. Average thickness of coal mined, 3 feet. Roof, smooth sandstone; above the sandstone is a second cap rock. Floor, smooth, hard, dark fire clay.

The coal bed was measured and sampled at one point in No. 1 mine and at two points in No. 2 mine by P. M. Riefkin on April 17, 1911, as described below:

Sections of coal bed in Lenore No. 1 and No. 2 mines.

Section.....	A	B	C
Laboratory No.....	12044	12045	12046
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 5½	-- --	-- --
Mother coal.....	Streak.	-- --	-- --
Coal.....	1 11	2 3½	2 2½
Coal, hard.....	0 3	0 3½	0 4
Floor, hard, dark fire clay.....			
Thickness of bed.....	2 7½	2 7	2 6¾
Thickness of coal sampled.....	2 7½	2 7	2 6¾

Section A (sample 12044) was measured at the face of left heading 3, off No. 2 drift.

Section B (sample 12045) was measured at the face of left heading 2, off No. 2 drift.

Section C (sample 12046) was measured at the face of left heading 1, off the main heading off No. 1 drift.

Notes.—At the time of sampling the coal at these mines was undercut by hand and shot down with FFFF black powder. Both mines load coal over the same tippie. There was one loading track with a capacity of 10 empty and 10 loaded cars. All of the coal was shipped as run-of-mine. Pickers were employed on the cars in loading. The mines were equipped to produce 200 tons a day, with an average daily output of 150 tons, all from advance workings. There was approximately 300 acres of unmined coal tributary to these entries. The two mines are equipped as a single mine.

MADERA. BUCHER MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12376, W20435, W20436, W20437, W20438, and W20439 (p. 86).

Mine.—Bucher, a drift mine in the Clearfield district, 2 miles north of Madera, on the Pennsylvania Railroad.

Coal bed.—Lower Kittanning or B. Carboniferous age, Allegheny formation. Average thickness, 3 feet 6 inches. The roof, a dark shale, is overlain by cannel coal 2 feet thick, above which is a sandstone cap rock. The floor is a hard shale 1 to 2 feet thick, underlain by a hard, rough clay about 10 feet thick.

The bed was measured and sampled at five points in the mine by H. I. Smith on June 9, 1911, as described below:

Sections of coal bed in Bucher mine.

Section.....	A	B	C	D	E
Laboratory No.....	W20435	W20436	W20437	W20438	W20439
Roof, sandstone, cannel coal, and dark shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	a 0 2	a 0 ¾	a 0 1	1 ½	0 8½
Bany coal.....	-- --	-- --	-- --	-- --	-- --
Mother coal.....	0 7	0 11	0 11	-- --	0 ¾
Coal.....	0 1	0 1	0 1	0 1	0 3½
Cannel coal.....	0 11½	0 10½	0 11	0 8	0 1
Coal.....	a 0 ¼	a 0 ¼	Streak.	a 0 ¼	a 0 10
"Mining slate".....	0 2	-- --	0 4½	a 0 2½	0 2½
Coal.....	-- --	-- --	0 ¼	a 0 ½	0 ¼
"Sulphur".....	1 1½	1 4	0 10½	1 6	0 11
Floor, shale and fire clay.....					
Thickness of bed.....	3 1½	3 3	3 3	3 6¾	3 2½
Thickness of coal sampled.....	2 11	3 2½	3 2	3 3½	3 1½

a Not included in sample.

Section A (sample W20435) was measured at the face of ninth left entry, off first cross heading, 3,400 feet northeast of the mouth of the main entry.

Section B (sample W20436) was measured at the face of eighth right heading, 3,800 feet northeast of the mouth of the main heading.

Section C (sample W20437) was measured at the face of tenth right heading, 4,500 feet northeast of the mouth of the main entry.

Section D (sample W20438) was measured at the face of seventh left heading, 3,000 feet northeast of the mouth of the main entry.

Section E (sample W20439) was measured at the face of seventh right heading, 3,200 feet northeast of the mouth of the main entry.

A composite sample was made by combining face samples W20435 to W20439, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 12376.

Notes.—At the time of sampling the coal was undercut with machines and broken down with black powder. There were no screens, the entire output being shipped as run-of-mine. Pickers were employed on the cars in loading. There was one loading track at the tippie with a capacity of about 40 cars. The mine had a capacity of 400 tons a day and an average daily output of 250 tons, of which the larger part was from advance workings. There was approximately 600 acres of unmined coal tributary to this opening.

MADERA. MORGAN RUN MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12368, W20402, W20403, W20404, W20405, and W20406 (p. 87).

Mine.—Morgan Run, a drift mine in the Clearfield district, 1 mile east of Madera on the Pennsylvania Railroad.

Coal bed.—Lower Kittanning or B. Carboniferous age, Allegheny formation. Average thickness, 3 feet 6 inches. The roof, a hard, dark, smooth shale, is overlain by 2 feet of cannel coal; above the cannel is sandstone. Floor, shale, underlain by clay.

The bed was measured and sampled at five points in the mine by H. I. Smith on June 8, 1911, as described below:

Sections of coal bed in Morgan Run mine.

Section.....	A	B	C	D	E
Laboratory No.....	W20402	W20403	W20404	W20405	W20406
Roof, sandstone, cannel coal, and shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 ½	0 8½	0 2½	0 3	0 9
"Sulphur".....	Streak.	Streak.	Streak.	Streak.	Streak.
Coal.....	0 3½	0 2	0 9	0 3½	0 4
Mother coal.....	0 1	.. ..	.. ..	.. ..	.. ..
Cannel coal.....	.. ..	0 2½	.. ..	.. ..	0 1
"Sulphur".....	.. ..	.. ..	Streak.	α 0 ½	.. ..
Coal.....	0 7	0 3	.. ..	0 6	0 11
Cannel coal.....	.. ..	.. ..	0 1½	0 1	0 1
"Binder slate".....	α 0 ¾	α 0 ¾	Streak.	Streak.	α 0 1
Coal.....	0 3½	0 5½	1 3	0 10	1 3½
"Binder slate".....	Streak.	α 0 1½	Streak.	α 0 1	.. ..
Coal.....	0 2	0 4½	0 4	0 10	.. ..
"Sulphur".....	Streak.	Streak.	.. ..	Streak.	.. ..
Coal.....	0 3	.. ..	.. ..	0 5½	.. ..
"Sulphur" ball.....	α 0 ½	.. ..	α 0 ½	.. ..	.. ..
Coal.....	0 7½	1 0	0 10½	.. ..	.. ..
Bony coal.....	.. ..	.. ..	0 1	0 ¾	.. ..
Floor, shale.	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 5½	3 3¾	3 7½	3 5½	3 6½
Thickness of coal sampled.....	3 4½	3 2	3 7½	3 3¾	3 5½

α Not included in sample.

Section A (sample W20402) was measured at the face of south entry 4, off right entry 5.

Section B (sample W20403) was measured at the face of east entry 3, off right entry 5.

Section C (sample W20404) was measured at the face of south entry 3, off right entry 5.

Section D (sample W20405) was measured at the face of south entry 1, off right entry 5.

Section E (sample W20406) was measured at the face of the main heading.

A composite sample was made by combining face samples W20402 to W20406, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 12368.

Notes.—At the time of sampling the coal was undercut by hand and broken down with black powder. There was one loading track at the tippie with a capacity of 16 empty and 16 loaded cars. Pickers were employed on the cars in loading. The mine was equipped to produce 400 tons a day; the average daily output was 380 tons. The unmined area was approximately 500 acres.

MORRISDALE. MORRISDALE NO. 1, NO. 2, AND NO. 3 MINES.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12072 to 12082, inclusive, and 12090 and 12092 (pp. 87, 88).

Mines.—Morrisdale No. 1, Morrisdale No. 2, and Morrisdale No. 3 shaft mines, each about 130 feet deep, in the Clearfield district, 1 mile south of Morrisdale, on the New York Central & Hudson River Railroad and the Pennsylvania Railroad.

Coal beds.—Lower Kittanning or B, and the Middle Kittanning or C. Carboniferous age. Allegheny formation. The coal, as mined, has an average thickness of 4 feet 6 inches in the C bed, and about 3 feet 6 inches in the B bed. The roof of both beds is a sandy shale; the floor is a hard fire clay with smooth surface. The B bed was measured and sampled at three points in No. 1 mine and at three in No. 3 mine and the C bed at two points in No. 1 mine and at two in No. 2 mine by P. M. Riefkin on April 20 and 21, 1911, as described below:

Sections of B bed in Morrisdale mines.

Mine.....	Shaft No. 1.			Shaft No. 3.		
Section.....	A	B	C	D	E	F
Laboratory No.....	12074	12075	12081	12076	12077	12078
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Top coal.....	a 0 $\frac{1}{2}$	0 5 $\frac{1}{2}$	.. ..	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$	a 0 1
Coal.....	0 4 $\frac{1}{2}$	0 5 $\frac{1}{2}$	.. ..	0 6 $\frac{1}{2}$	0 8 $\frac{1}{2}$	0 6 $\frac{1}{2}$
"Sulphur".....	Streak.	a 0 $\frac{1}{2}$	.. ..	.. ..	.. ..	.. ..
Coal.....	0 6 $\frac{1}{2}$	0 4 $\frac{1}{2}$	0 10 $\frac{1}{2}$	.. ..	.. ..	.. ..
Bone.....	a 0 $\frac{1}{2}$	a 0 3	a 0 2 $\frac{1}{2}$	a 0 $\frac{1}{2}$	a 0 6 $\frac{1}{2}$	a 0 7
Bony coal.....	a 0 4	a 0 2 $\frac{1}{2}$	a 0 3 $\frac{1}{2}$	a 0 6	a 0 1 $\frac{1}{2}$	.. ..
Coal.....	1 1	1 6	2 0	2 2	2 3 $\frac{1}{2}$	2 8
"Sulphur".....	a 0 $\frac{1}{2}$	.. ..	Streak.	a 0 $\frac{1}{2}$	.. ..	.. ..
Coal.....	0 9 $\frac{1}{2}$	.. ..	.. ..	0 10 $\frac{1}{2}$	.. ..	.. ..
"Sulphur".....	Streak.	0 $\frac{1}{2}$	0 $\frac{1}{2}$	.. ..	.. ..	.. ..
Coal.....	0 10	1 5 $\frac{1}{2}$	0 8 $\frac{1}{2}$	.. ..	.. ..	.. ..
Floor, hard clay.....	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	4 $\frac{1}{2}$	4 3 $\frac{3}{4}$	4 1 $\frac{1}{2}$	4 1 $\frac{1}{2}$	3 8	3 10 $\frac{1}{2}$
Thickness of coal sampled.....	3 7 $\frac{1}{4}$	3 9 $\frac{3}{4}$	3 6 $\frac{1}{2}$	3 6	2 11 $\frac{1}{2}$	3 2 $\frac{1}{2}$

a Not included in sample.

Section A (sample 12074) was measured at the face of the main heading, 5,240 feet from the bottom of shaft No. 1.

Section B (sample 12075) was measured at the face of room 13, off eighth right heading off the main heading, 5,040 feet from the bottom of shaft No. 1.

Section C (sample 12081) was measured at the face of room 45, off fourth right entry, off the main heading, 5,200 feet from the bottom of shaft No. 1.

Section D (sample 12076) was measured at the face of room 5, off first left heading, off new slope tunnel, 1,400 feet from shaft No. 3.

Section E (sample 12077) was measured at the face of shaft No. 2 heading, main dip, 5,500 feet from shaft No. 3.

Section F (sample 12078) was measured at the face of the Morrisdale heading, 6,300 feet from shaft No. 3.

A composite sample was made of face samples 12074, 12075, and 12081. The results of an ultimate analysis of this sample are shown under laboratory No. 12090.

A composite sample was also made of face samples 12076, 12077, and 12078. The results of an ultimate analysis of this sample are shown under laboratory No. 12092.

Sections of C bed in Morrisdale mines.

Mine.....	Shaft No. 2.		Shaft No. 1.	
Section.....	A	B	C	D
Laboratory No.	12072	12073	12079	12080
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Top, bony coal.....	0 1½	0 2	a 0 3½	Streak.
Coal.....	.. ..	.. ..	0 7½	0 6
Mother coal.....	.. ..	.. ..	.. ..	0 ½
Coal.....	.. ..	1 7½	1 7	1 4
"Sulphur".....	.. ..	.. ..	0 ½	.. ..
Coal, gray.....	.. ..	0 2½	.. ..	0 1
Coal.....	2 11½	2 0	2 5½	1 3½
Coal, gray.....	0 1	.. ..	.. ..	0 1
Coal.....	0 4½	.. ..	.. ..	0 10
Shale.....	.. ..	.. ..	.. ..	a 0 ½
Mother coal.....	0 ½	.. ..	.. ..	.. ..
Coal.....	0 8½	.. ..	.. ..	0 2
Bony coal.....	a 0 1½	.. ..	.. ..	0 ½
Coal.....	0 6	.. ..	.. ..	0 2
Bottom coal.....	.. ..	a 0 1	.. ..	.. ..
Floor, fire clay.....	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	4 10½	4 1	5 0	4 6
Thickness of coal sampled.....	4 9	4 0	4 8½	4 5½

a Not included in sample.

Section A (sample 12072) was measured at the face of the sixth heading, 4,500 feet from the bottom of shaft No. 2.

Section B (sample 12073) was measured at the face of room 9, off the second left heading, off Lucky strike, 2,200 feet from the bottom of shaft No. 2.

Section C (sample 12079) was measured at the face of the sump heading, 3,100 feet from shaft No. 1.

Section D (sample 12080) was measured at the face of the McKinley heading off Truck main heading, 5,850 feet from the bottom of shaft No. 1.

A composite sample was made by combining face samples 12072 and 12073. The results of an ultimate analysis of this sample are given under laboratory No. 12091.

A composite sample was also made by combining face samples 12079 and 12080. The results of an ultimate analysis of this sample are shown under laboratory No. 12082.

Notes.—At the time of sampling the coal was undercut with air punchers and shot down with black powder. There were four loading tracks at the tippie with a capacity of 120 empty and 160 loaded railroad cars. The entire production was shipped as run-of-mine; pickers were employed on the cars in loading. The mine was equipped to produce about 2,700 tons a day and had a daily output of 2,240 tons. About 75 per cent of the coal was derived from advance workings. It was planned to increase the production about 600 tons at an early date. There was approximately 4,000 acres of unmined coal tributary to these shafts. All of the mines loaded coal over the same tippie.

MUNSON. COLORADO NO. 5 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12109, 12110, 12111, 12112, 12113, and 12114 (pp. 88, 89).

Mine.—Colorado No. 5, a drift mine in the Clearfield district, at Munson, on the New York Central & Hudson River Railroad.

Coal bed.—Lower Kittanning or B. Carboniferous age, Allegheny formation. Average thickness, 4 feet. Roof, shale; floor, fire clay. Particles of the roof or floor did not become mixed with the coal in mining.

The bed was measured and sampled at five points in the mine by H. I. Smith on April 22, 1911, as described below:

Sections of coal bed in Colorado No. 5 mine.

Section.....	A		B		C		D		E	
Laboratory No.....	12109		12110		12111		12112		12113	
Roof, shale.....	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Top coal.....	a0	9	a0	9½	a0	9½	a0	7½	a0	9½
Coal, bony.....	a0	4	a0	3	a0	4	a0	6	a0	3
Coal, gray.....	1	0	1	2½	0	6½	0	5½	0	8
Coal.....	..	..	..	..	0	1½	0	1	0	3
Coal, gray.....	..	..	..	..	0	3½	0	½	0	1
Coal.....	..	..	..	..	..	..	0	1½	..	..
Coal, gray.....	..	..	..	..	..	..	0	3	..	..
Coal.....	2	0	1	10½	2	0	2	1	1	8
"Sulphur".....	Streak.	..	Streak.	..	0	½	Streak.	..	0	½
Coal.....	..	..	0	1	0	3	0	1½	1	½
Floor, fire clay.....	..	..	..	..	..	..	..	..	..	..
Thickness of bed.....	4	1	4	2½	4	4½	4	3½	4	10½
Thickness of coal sampled.....	3	0	3	2	3	2¾	3	2	3	9½

a Not included in sample.

Section A (sample 12109) was measured at the face of sixth left entry, off the line heading.

Section B (sample 12110) was measured at the face of eighth left entry, off the main heading, 3,000 feet from the drift mouth.

Section C (sample 12111) was measured at the face of the main heading, 3,600 feet from the drift mouth.

Section D (sample 12112) was measured at the face of the line heading.

Section E (sample 12113) was measured at the face of sixth left heading, off the main heading.

A composite sample was made by combining face samples 12109 to 12113, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 12114.

Notes.—At the time of sampling the coal was undercut by chain machines in the lower part of the bed and broken down with black powder. At the tippie were two loading tracks with a capacity of 20 empty and 15 loaded cars. The cars were shifted twice daily by the railroad company. The coal was hand picked wherever necessary. The mine had a capacity of 600 tons, with a daily output of 350 tons, derived principally from advance workings.

OSCEOLA MILLS. FAIRMOUNT No. 2 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. W17010 and W17012 (p. 89).

Mine.—Fairmount No. 2, a drift mine in the Clearfield district, 3 miles west of Osceola Mills on the Pennsylvania Railroad.

Coal bed.—Lower Freeport or D. Carboniferous age, Allegheny formation. Thickness, 5 to 6 feet. Roof, bone; floor, shale underlain by fire clay.

The bed was measured and sampled at two points in the mine by P. M. Riefkin on January 23, 1911, as described below:

Sections of coal bed in Fairmount No. 2 mine.

Section.....	A		B	
Laboratory No.....	W17010		W17012	
Roof, bone.....	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Coal.....	2	11½	1	4½
Mother coal.....	0	4	..	..
"Sulphur".....	..	..	0	½
Coal.....	1	5½	1	6
"Sulphur".....	0	½	Trace.	..
Coal.....	0	7½	2	4½
Floor, shale.....	..	..	..	..
Thickness of bed.....	5	1	5	3½
Thickness of coal sampled.....	5	1	5	3½

Section A (sample W17010) was measured at the face of room 5, off second left heading.

Section B (sample W17012) was measured at the face of room 14, off eighth right heading.

A composite sample was made by combining face samples W17010 and W17012. The results of an ultimate analysis of this sample are shown under laboratory No. 17111.

Notes.—At the time of sampling the coal was undercut by hand and shot down with black powder. There were no screens at the tippie, the entire output being shipped as run-of-mine. The average daily output was about 300 tons.

PHILIPSBURG. GUION MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12367, W20369, W20370, W20371, W20372, and W20373 (p. 89).

Mine.—Guion, a drift mine in the Clearfield district, 2 miles west of Philipsburg (Center County) on the Pennsylvania Railroad.

Coal bed.—Miller, B, or Lower Kittanning. Carboniferous age, Allegheny formation. Average thickness, 3 feet 4 inches. Roof, black shale 1 foot thick, overlain by roof coal 1 foot thick; above the roof coal is a sandstone cap rock. Floor, a hard sulphur-bearing rock 8 inches thick, underlain by soft smooth fire clay.

The bed was measured and sampled at five points in the mine by H. I. Smith on June 7, 1911, as described below:

Sections of coal bed in Guion mine.

Section.....	A	B	C	D	E
Laboratory No.....	W20369	W20370	W20371	W20372	W20373
Roof, sandstone, roof coal and black shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bony.....	0 9	.. ..	α 0 2 $\frac{1}{2}$	.. ..	α 0 2 $\frac{1}{2}$
Coal with flakes of sulphur on "slips".....	.. ..	.. ..	α 0 4 $\frac{1}{2}$	0 3 $\frac{1}{2}$	.. ..
Coal.....	.. ..	1 2	.. ..	1 0	0 5
Coal, hard.....	0 8	0 2	.. ..	0 5	.. ..
Shale.....	.. ..	.. ..	α 0 3	.. ..	α 0 1
Coal.....	1 6	1 8	0 3 $\frac{1}{2}$	1 5	0 5
"Sulphur".....	.. ..	.. ..	α 0 $\frac{1}{2}$	.. ..	.. ..
Cannel coal.....	0 2 $\frac{1}{2}$	0 2	.. ..	0 4	.. ..
Coal, hard.....	.. ..	.. ..	0 10 $\frac{1}{2}$	.. ..	0 8
Coal, soft, fibrous.....	.. ..	.. ..	0 11	.. ..	0 9
"Sulphur".....	.. ..	.. ..	Streak.	.. ..	0 $\frac{1}{2}$
Coal.....	.. ..	.. ..	0 7	.. ..	0 11 $\frac{1}{2}$
Floor, sulphur-bearing rock and fire clay.	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 1 $\frac{1}{2}$	3 2	3 4	3 5 $\frac{1}{2}$	3 6 $\frac{1}{2}$
Thickness of coal sampled.....	3 1 $\frac{1}{2}$	3 2	2 8	3 5 $\frac{1}{2}$	3 2 $\frac{1}{2}$

α Not included in sample.

Section A (sample W20369) was measured at the face of first right heading, off right entry 2, 4,000 feet from the mine mouth.

Section B (sample W20370) was measured at the face of second right heading, 4,000 feet from the mouth of the main entry.

Section C (sample W20371) was measured at the face of the back heading, off right entry 1, 2,500 feet from the mouth of the main entry.

Section D (sample W20372) was measured 50 feet from the face of first left heading, off right entry 2.

Section E (sample W20373) was measured at the face of first left heading, off right entry 1, about 2,200 feet from the mouth of the main entry.

A composite sample was made by combining face samples W20369 to W20373. The results of an ultimate analysis of this sample are shown under laboratory No. 12367.

Notes.—At the time of sampling the coal was undercut with machines and shot down with black powder. There was one loading track, with a capacity of about 25 cars. There were no screens, the entire output being shipped as run-of-mine. The mine had a capacity of 300 tons a day, and an average daily output of about 250 tons. An increase in the production to 900 tons a day was contemplated. There was approximately 300 acres of unmined coal tributary to this opening.

SMOKE RUN. VIOLA MINE.

Sample.—Semibituminous coal; Windber field; analyses No. 11748, 11749, 11750, 11751, W18355, W18356, W18357, W18358, and W18359 (pp. 89, 90).

Mine.—Viola, a slope mine in Gulic Township, Clearfield district, 3½ miles southeast of Smoke Run, on the Little Muddy Run branch of the Pennsylvania Railroad.

Coal bed.—Lower Kittanning, Miller, or B. Carboniferous age, Allegheny formation. Average thickness, about 5 feet 4 inches. The bed is practically level. Roof, "draw slate" 18 inches thick, overlain by sandstone; floor, hard smooth fire clay. Cover, 100 to 125 feet.

The bed was measured and sampled at three points in the mine by L. M. Jones on February 23, 1911, as described below:

Sections of coal bed in Viola mine.

Section.....	A	B	C
Laboratory No.....	11748	11749	11750
Roof, sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, soft and coarse.....	0 5	1 4	0 10
Coal, soft and fine.....	1 4	1 4	0 7
Coal, bony.....	.. ..	0 ½	.. ..
Coal.....	.. ..	0 4	.. ..
Coal, bony.....	α 0 10	α 0 10	α 1 0
Coal, soft and fine.....	2 8	0 10	2 3½
Bone (local).....	.. ..	.. ..	0 ½
"Sulphur" band.....	0 ½	α 0 3	.. ..
Coal, soft.....	0 4½	0 11¾	0 7½
"Sulphur" band.....	.. ..	α 0 4	.. ..
Coal, soft and dirty.....	.. ..	0 7	.. ..
Floor, fire clay.....	.. ..	.. ..	.. ..
Thickness of bed.....	5 8	5 ½	5 4½
Thickness of coal sampled.....	4 10	4 ¾	4 4½

α Not included in sample.

Section A (sample 11748) was measured near the face of ninth left heading beyond room 18, 1,300 feet from the main haulage way.

Section B (sample 11749) was measured at the face of the second slant to the right near room 3.

Section C (sample 11750) was measured at the face of the main entry, 4,750 feet southwest of the mine mouth.

A composite sample was made by combining face samples 11748, 11749, and 11750. The results of an ultimate analysis of this sample are shown under laboratory No. 11751.

The bed was also measured and sampled at five points in the mine by P. M. Riefkin on March 7, 1911, as described below:

Sections of coal bed in Viola mine.

Section.....	A	B	C	D	E
Laboratory No.....	W18355	W18356	W18357	W18358	W18359
Roof, sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 7	1 7½	1 7¾	0 9½	1 3¾
"Sulphur".....	.. ..	.. ..	.. ..	0 8	0 ½
Coal.....	.. ..	.. ..	.. ..	0 10½	0 6½
Soft bone.....	α 0 3	0 4½	α 0 3	α 0 2½	α 0 4
Coal, bony.....	α 0 8	0 5	α 0 9	0 7½	α 0 6
Coal.....	.. ..	0 10¾	.. ..	.. ..	.. ..
"Blue binder".....	.. ..	α 0 7¾	.. ..	.. ..	.. ..
Coal.....	2 2½	1 3½	2 5¾	2 2¾	1 10
"Sulphur".....	0 ½	α 0 1	0 ¾	α 0 ½	α 0 1
Coal.....	0 7½	0 4	0 5¾	0 4	0 4½
Floor, shale.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	5 4½	5 0	5 7¾	5 1½	5 0
Thickness of coal sampled.....	4 5½	4 11	4 7¾	4 10¾	4 1

α Not included in sample.

Section A (sample W18355) was measured at the face of tenth left entry, 100 feet from room 12.

Section B (sample W18356) was measured near the face of the third slant entry, 100 feet above room 1.

Section C (sample W18357) was measured near the face of left heading 9.

Section D (sample W18358) was measured at the face of the main entry, 4,800 feet southwest of the mine mouth.

Section E (sample W18359) was measured at the face of the second slant entry, 100 feet above the third slant entry.

Notes.—The double-entry room-and-pillar system of mining is employed. At the time of sampling, the coal was undercut by hand and shot down with FFF black powder. There was one loading track at the tippie with a capacity of 20 empty and 17 loaded cars. There were no screens, the entire production being shipped as run-of-mine. Pickers were employed on the cars in loading. The average daily output was about 550 tons. There was 800 acres of unmined coal.

HUNTINGDON COUNTY.

ROBERTSDALE. ROBERTSDALE MINE.

Sample.—Semibituminous coal; Broad Top field; analyses Nos. 12115, 12116, 12117, 12118, 12119, and 12120 (p. 90).

Mine.—Robertsdales, a slope mine in the Broad Top district, at Robertsdales, on the East Broad Top railroad, with connections to the Pennsylvania Railroad at Mount Union.

Coal bed.—Fulton, Lower Kittanning, or B. Carboniferous age, Allegheny formation. Average thickness, 5 feet. Roof, dark, smooth shale; floor, hard, smooth fire clay.

The bed was measured and sampled at five points in the mine by H. I. Smith on April 25, 1911, as described below:

Sections of coal bed in Robertsdales mine.

Section.....	A 12115	B 12116	C 12117	D 12118	E 12119
Laboratory No.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, shale.....	a 0 1½	a 0 8	a 0 5	a 0 1	0 8
Bone and shale.....	1 4	0 2	0 6	1 9	-- --
Coal.....	a 0 1	a 0 ½	a 0 1	-- --	-- --
Coal, bony.....	0 2½	0 2	0 2	-- --	-- --
Coal, bony.....	a 0 2½	a 0 ¼	0 1	-- --	0 ¾
Coal.....	0 3	0 8	1 1	-- --	0 3½
Coal, gray.....	0 ½	0 ½	0 ¾	0 ½	-- --
Coal.....	0 11	0 11	1 0	0 8½	1 ½
"Middle rock".....	a 1 1	a 0 8	a 0 6½	a 0 5	a 0 5
Coal.....	-- --	-- --	0 1	-- --	-- --
Bone and coal.....	a 0 2	a 0 2	a 0 1½	a 0 2	a 0 1
Coal.....	1 2½	1 2½	1 9½	1 4	1 0
"Sulphur" and bone.....	a 0 1½	0 ½	a 0 2	a 0 1	0 ½
Coal.....	0 6½	0 7	-- --	0 5	0 4
Bone and "sulphur".....	-- --	a 0 ½	-- --	a 0 3	a 0 1
Floor, hard fire clay.....					
Thickness of bed.....	6 3½	5 4	6 1½	5 3	3 11½
Thickness of coal sampled.....	4 5½	3 9	4 9½	4 3	3 4½

a Not included in sample.

Section A (sample 12115) was measured at the face of north heading 6.

Section B (sample 12116) was measured at the face of the main west heading.

Section C (sample 12117) was measured at the face of south heading 6.

Section D (sample 12118) was measured at the face of south heading 8.

Section E (sample 12119) was measured at the face of south heading 5.

A composite sample was made by combining face samples 12115 to 12119, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 12120.

Notes.—At the time of sampling the coal was undercut by hand and shot down with FFFF and FFF black powder. At the tippie was one loading track with a capacity of 50 empty and 50 loaded cars. All of the coal was shipped as run-of-mine. Pickers were employed on the cars in loading. The mine had a capacity of about 900 tons a day with an average daily output of 825 tons, two-thirds of which was from advance workings. There was approximately 500 acres of unmined coal. The slope is connected under ground with the Woodvale shaft.

WOODVALE. WOODVALE MINE.

Sample.—Semibituminous coal; Broad Top field; analyses Nos. 12121, 12122, 12123, 12124, and 12125 (pp. 90, 91).

Mine.—Woodvale, a shaft mine in the Broad Top district at Woodvale, on the East Broad Top railroad, with connections to the Pennsylvania Railroad at Mount Union.

Coal bed.—Fulton, Lower Kittanning, or B. Carboniferous age, Allegheny formation. Average thickness, 5 feet. Roof, shale, overlain by sandstone; floor, fire clay.

The bed was measured and sampled at four points in the mine by H. I. Smith on April 24, 1911, as described below:

Sections of coal bed in Woodvale mine.

Section.....	A		B		C		D	
	12121	12122	12122	12123	12123	12124	12124	12124
Laboratory No.....	Ft.	in.	Ft.	in.	Ft.	in.	Ft.	in.
Roof, shale.....	0	7 $\frac{1}{2}$	1	7 $\frac{1}{2}$	1	8 $\frac{1}{2}$	0	7
Coal.....	0	7 $\frac{1}{2}$	0	7 $\frac{1}{2}$	0	7 $\frac{1}{2}$	0	7 $\frac{1}{2}$
Mother coal and "sulphur".....	0	2 $\frac{1}{2}$	0	2 $\frac{1}{2}$	0	2 $\frac{1}{2}$	0	11 $\frac{1}{2}$
Coal.....	0	2 $\frac{1}{2}$	0	2 $\frac{1}{2}$	0	2 $\frac{1}{2}$	0	11 $\frac{1}{2}$
Bony coal.....	0	5	0	10	0	9	0	9 $\frac{1}{2}$
Coal.....	0	5	0	10	0	9	0	9 $\frac{1}{2}$
Bony coal and "sulphur".....	0	5	0	10	0	9	0	9 $\frac{1}{2}$
Coal.....	0	5	0	10	0	9	0	9 $\frac{1}{2}$
Bony coal.....	0	5	0	10	0	9	0	9 $\frac{1}{2}$
Coal.....	0	5	0	10	0	9	0	9 $\frac{1}{2}$
"Middle rock".....	0	10 $\frac{1}{2}$	0	10 $\frac{1}{2}$	0	13 $\frac{1}{2}$	0	10 $\frac{1}{2}$
Bony coal, gray.....	0	7 $\frac{1}{2}$	0	7 $\frac{1}{2}$	0	5 $\frac{1}{2}$	0	5
"Sulphur".....	0	7 $\frac{1}{2}$	0	7 $\frac{1}{2}$	0	5 $\frac{1}{2}$	0	5
Coal.....	0	7 $\frac{1}{2}$	0	7 $\frac{1}{2}$	0	5 $\frac{1}{2}$	0	5
Soft parting.....	0	7 $\frac{1}{2}$	0	7 $\frac{1}{2}$	0	5 $\frac{1}{2}$	0	5
Coal.....	1	7 $\frac{1}{2}$	0	9	0	10	0	10 $\frac{1}{2}$
Bony coal and "sulphur".....	0	7 $\frac{1}{2}$	0	9	0	10	0	10 $\frac{1}{2}$
Coal.....	0	7 $\frac{1}{2}$	0	9	0	10	0	10 $\frac{1}{2}$
Floor, fire clay.....	4	5 $\frac{3}{4}$	4	6 $\frac{3}{4}$	4	9 $\frac{3}{4}$	5	10 $\frac{3}{4}$
Thickness of bed.....	4	5 $\frac{3}{4}$	4	6 $\frac{3}{4}$	4	9 $\frac{3}{4}$	5	10 $\frac{3}{4}$
Thickness of coal sampled.....	3	9 $\frac{3}{4}$	3	7 $\frac{1}{4}$	3	11 $\frac{3}{4}$	5	18 $\frac{3}{4}$

^a Not included in sample.

Section A (sample 12121) was measured at the face of first south heading.

Section B (sample 12122) was measured at the face of the third south or upcreek heading.

Section C (sample 12123) was measured at the face of the second west tunnel.

Section D (sample 12124) was measured at the face of No. 7 or Bolinger heading.

A composite sample was made by combining face samples 12121 to 12124, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 12125.

Notes.—At the time of sampling the coal was undercut by hand and broken down with FFFF and FFF black powder. There were two loading tracks at the tippie with a capacity of 50 empty and 50 loaded cars. The tippie was equipped with bar screens. The entire output was shipped as run-of-mine coal. Pickers were employed on the cars in loading. The daily output was 600 tons, which was from both advance workings and from pillars. There was approximately 800 acres of unmined coal. This mine is connected underground with the Robertsedale slope mine.

INDIANA COUNTY.

CLYMER. EMPIRE M (McKEAN) MINE.

Sample.—Bituminous coal; Punxsutawney field; analyses Nos. 12219, W19678, W19680, W19682, W19685, and W19687 (p. 91).

Mine.—Empire M (McKean,) a drift mine $1\frac{1}{2}$ miles north of Clymer, on the New York Central Railroad.

Coal bed.—Lower Kittanning or B. Carboniferous age, Allegheny formation. Average thickness, 3 feet. Roof hard, smooth shale; floor, fire clay.

The bed was measured and sampled at five points in the mine by P. M. Riefkin on April 29, 1911, as described below:

Sections of coal bed in Empire M (McKean) mine.

Section.....	A	B	C	D	E
Laboratory No.....	W19678	W19680	W19682	W19685	W19687
Roof, shale and bone.....	<i>Ft. In.</i>	<i>Ft. In.</i>	<i>Ft. In.</i>	<i>Ft. In.</i>	<i>Ft. In.</i>
Coal.....	0 11	0 11	0 $8\frac{1}{2}$	1 0	1 $\frac{1}{2}$
Mother coal.....	.. ..	.. ..	0 $\frac{1}{8}$	.. ..	.. ..
Coal.....	.. ..	.. ..	0 $4\frac{1}{2}$	.. ..	.. ..
Cannel coal.....	0 1	0 $1\frac{1}{2}$	0 $\frac{3}{4}$	0 $\frac{1}{4}$	0 $\frac{1}{2}$
Coal.....	0 8	1 0	0 $8\frac{1}{2}$	0 9	.. ..
"Sulphur," soft.....	.. ..	.. ..	0 $\frac{1}{2}$	Streak.	.. ..
Coal.....	.. ..	.. ..	0 $4\frac{1}{2}$	0 $5\frac{1}{2}$	.. ..
"Sulphur," hard.....	0 $\frac{1}{2}$	0 $\frac{1}{4}$	a 0 $\frac{3}{8}$	.. ..	.. ..
Mother coal.....	.. ..	.. ..	.. ..	0 $\frac{1}{2}$	.. ..
Coal.....	1 $6\frac{1}{2}$	0 $7\frac{1}{2}$	0 $7\frac{1}{2}$	1 $\frac{1}{2}$	1 $6\frac{1}{2}$
"Sulphur".....	.. ..	Streak.	Streak.	.. ..	0 $\frac{1}{8}$
Mother coal.....	.. ..	.. ..	.. ..	0 1	.. ..
Coal.....	.. ..	0 6	0 $4\frac{1}{2}$	.. ..	0 $7\frac{1}{2}$
Floor, soft fire clay, smooth.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 $2\frac{3}{4}$	3 $2\frac{1}{2}$	3 $3\frac{1}{2}$	3 $5\frac{1}{2}$	3 $3\frac{1}{2}$
Thickness of coal sampled.....	3 $2\frac{1}{4}$	3 $2\frac{1}{2}$	3 $3\frac{3}{8}$	3 $5\frac{1}{4}$	3 $3\frac{3}{4}$

a Not included in sample.

Section A (sample W19678) was measured at the face of room 56, off right entry 2, off the main entry, 4,000 feet east of the mine mouth.

Section B (sample W19680) was measured at the corner of a crosscut at room 40, off right entry 2, off the main entry, 3,000 feet southeast of the mine mouth.

Section C (sample W19682) was measured at the corner of the pillar of room 44, off right entry 1, off the main entry, 2,500 feet west of the mine mouth.

Section D (sample W19685) was measured near the face of the first parallel off the south heading, off right entry 1, off the main entry, 2,800 feet southwest of the mine mouth.

Section E (sample W19687) was measured at the face of the third parallel off the south heading, off right entry 1, off the main entry, 3,000 feet northwest of the mine mouth.

A composite sample was made by combining face samples W19678, W19680, W19685, and W19687. The results of an ultimate analysis of this sample are shown under laboratory No. 12223.

Notes.—At the time of sampling the coal was undercut by hand and shot down with FFFF black powder. All of the coal was shipped as run-of-mine. Pickers were employed on the cars in loading. There was one loading track with a capacity of 25 loaded and 50 empty cars. The mine was equipped to produce 700 tons a day; the average daily output was 360 tons, a large part of which was from advance workings. There was about 1,200 acres of unmined coal tributary to this opening.

CLYMER. EMPIRE R MINE.

Sample.—Bituminous coal, Punxsutawney field; analyses Nos. 12219, W19679, W19681, W19683, W19684, and W19686 (p. 91).

Mine.—Empire R, a drift mine, 1 mile north of Clymer on the New York Central & Hudson River Railroad.

Coal bed.—Lower Kittanning or B. Carboniferous age, Allegheny formation. Average thickness, 3 feet; cannel coal is persistent throughout the bed. Roof, smooth shale; floor, hard, smooth fire clay.

The bed was measured and sampled at five points in the mine by P. M. Riefkin on April 29, 1911, as described below:

Sections of coal bed in Empire R mine.

Section.....	A	B	C	D	E
Laboratory No.....	W19679	W19681	W19683	W19684	W19686
Roof, shale and bony coal.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 8½	.. ..	0 5	0 4	.. ..
"Sulphur" and mother coal.....	0 ½	.. ..	Streak.	0 ½	.. ..
Coal.....	0 5	1 ½	0 7½	0 7	0 8½
Cannel coal, gray.....	0 ¾	0 ¾	0 1	0 ¾	0 1½
Coal.....	0 7	0 7½	0 11½	0 6½	.. ..
"Sulphur" and mother coal.....	a 0 ¾	.. ..	Streak.	Streak.	.. ..
Coal.....	0 2	.. ..	0 4½	0 10½	.. ..
"Sulphur".....	.. ..	.. ..	0 ¾	0 ½	.. ..
Mother coal.....	.. ¼	Streak.	.. ..	.. ..	.. ..
Coal.....	1 2½	1 5½	1 5½	0 9½	2 4½
Floor, hard fire clay, smooth.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 2½	3 2	3 10½	3 2½	3 2½
Thickness of coal sampled.....	3 1½	3 2	3 10½	3 2½	3 2½

a Not included in sample.

Section A (sample W19679) was measured at a cross-cut at the corner of room 47, off left entry 1 off the main entry, 4,700 feet southeast of the mine mouth.

Section B (sample W19681) was measured on the pillar at room 28, off left entry 2 off the main entry, 2,200 feet east of the mine mouth.

Section C (sample W19683) was measured at the face of room 3, off right entry 1 off the main entry, 1,100 feet south of the mine mouth.

Section D (sample W19684) was measured at the face of room 11, off left entry 5 off the main entry, 1,900 feet southeast of the mine mouth.

Section E (sample W19686) was measured near the face of room 43, off left entry 4 off the main entry, 3,100 feet from the mine mouth.

A composite sample was made by combining face samples W19679, W19683, W19684, and W19686. The results of an ultimate analysis of this sample are given under laboratory No. 12219.

Notes.—At the time of sampling the coal was undercut by hand and shot down with FFFF black powder. All of the coal was shipped as run-of-mine. Pickers were employed on the cars in loading. There was one loading track with a capacity of 24 empty and 24 loaded cars. The mine was equipped to produce 500 tons a day and had a daily average production of 275 tons. About 75 per cent of the coal was derived from pillars. There was approximately 235 acres of unmined coal tributary to this entry.

GLEN CAMPBELL. INDIANA NO. 6 MINE.

Sample.—Bituminous coal; Punxsutawney field; analyses Nos. 12102, 12103, 12104, 12105, 12106, and 12107 (p. 92).

Mine.—Indiana No. 6, a drift mine at Glen Campbell, in Montgomery Township, 2½ miles north of Huvershurst Junction on the New York Central & Hudson River Railroad. The mine is connected with the main line of the New York Central by the Huvershurst & Southwestern Railroad.

Coal bed.—E or Upper Freeport. Average thickness, about 4 feet 10 inches. Roof, shale; floor, hard, smooth fire clay. Cover at points of sampling, 100 to 225 feet. The bed was sampled at five points in the mine by P. M. Riefkin on April 25, 1911, as described on the following page.

Sections of coal bed in Indiana No. 6 mine.

Section.....	A	B	C	D	E
Laboratory No.....	12102	12103	12104	12105	12106
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bony.....	a 0 3	a 0 9	a 0 6	a 0 7 $\frac{1}{2}$	a 0 5 $\frac{3}{4}$
Coal.....	1 4	1 8	1 10	1 5	0 7
"Sulphur".....	.....	.....	.....	a 0 $\frac{1}{2}$	.....
Mother coal.....	0 $\frac{1}{4}$	0 $\frac{1}{4}$	0 $\frac{3}{8}$	.....	0 $\frac{1}{4}$
Coal.....	.....	0 3	0 3	.....	1 4
Mother coal.....	.....	.....	0 $\frac{3}{4}$	.....	0 $\frac{1}{8}$
Coal, hard.....	2 0	1 9	.....	.....	.....
Coal.....	.....	.....	1 6	2 1	1 6 $\frac{1}{4}$
Coal, bony.....	a 0 $\frac{3}{4}$	a 0 1 $\frac{1}{2}$	a 0 1 $\frac{1}{2}$	a 0 1	a 0 1
Coal.....	0 4	0 5	0 5	0 5	0 6 $\frac{3}{4}$
Coal, bony.....	a 0 3 $\frac{3}{4}$	a 0 1 $\frac{1}{2}$	a 0 2 $\frac{1}{2}$	a 0 1	a 0 3
Floor, clay.....	.....	.....	.....	.....	.....
Thickness of bed.....	4 3 $\frac{3}{4}$	4 10 $\frac{1}{4}$	4 11 $\frac{1}{2}$	4 8 $\frac{3}{4}$	4 10 $\frac{1}{8}$
Thickness of coal sampled.....	3 8 $\frac{1}{4}$	3 10 $\frac{1}{4}$	4 1 $\frac{1}{8}$	3 11	4 $\frac{1}{8}$

a Not included in sample.

Section A (sample 12102) was measured at the face of left heading 7, off the main entry, 3,000 feet northwest of the mine mouth.

Section B (sample 12103) was measured at the face of room 10, off left entry 1, off the main heading, 1,000 feet northeast of the mine mouth.

Section C (sample 12104) was measured on the rib near the face of room 14 in right heading 7, off the main entry, about 2,000 feet northwest of the mine mouth.

Section D (sample 12105) was measured at the face of left heading 6, off the main entry, about 2,200 feet southwest of the mine mouth.

Section E (sample 12106) was measured near the face of room 1, off right heading 8, off the main entry, about 2,300 feet northwest of the mine mouth.

Notes.—The mine is worked on the room-and-pillar system. At the time of sampling, FFF black powder was used both for breaking the coal and brushing the roof or floor. The coal was undercut by hand. The output was 350 tons a day, with a capacity of 550 tons. About 40 per cent of the coal mined was from pillars and about 60 per cent from advance workings. There was about 100 acres of coal tributary to this opening.

HOMER CITY. TEARING RUN MINE.

Sample.—Bituminous coal; Punxsutawney field; analyses Nos. 12373, W20428, W20429, W20430, W20431, and W20432 (pp. 92, 93).

Mine.—Tearing Run, a drift mine, 1 mile northwest of Homer City, on the Pennsylvania Railroad.

Coal bed.—E, or Upper Freeport. Carboniferous age, Allegheny formation. Roof, shale about 10 to 12 inches thick, overlain by sandstone; floor, hard, smooth shale. Average thickness, 5 feet 6 inches. There is a persistent binder of bony coal about 15 inches below the shale roof.

The bed was measured and sampled at five points in the mine by P. M. Riefkin on June 9, 1911, as described below:

Sections of coal bed in Tearing Run mine.

Section.....	A	B	C	D	E
Laboratory No.....	W20428	W20429	W20430	W20431	W20432
Roof, sandstone and gray shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 3	1 3	1 5 $\frac{1}{2}$	1 4 $\frac{1}{2}$	1 6
"Sulphur".....	a 0 $\frac{3}{4}$	a 0 $\frac{1}{2}$	.....	.....	.....
Coal.....	.....	0 3	.....	.....	.....
Bony coal.....	.....	a 0 10	a 0 11	a 0 9 $\frac{1}{4}$	a 0 8 $\frac{3}{4}$
Coal.....	1 11 $\frac{1}{2}$	1 6 $\frac{3}{4}$	1 7 $\frac{1}{2}$	1 13 $\frac{1}{2}$	1 3 $\frac{1}{2}$
"Sulphur".....	.....	0 $\frac{1}{4}$	Streak.	0 $\frac{1}{4}$	0 $\frac{1}{8}$
Coal.....	.....	.....	.....	.....	0 6
"Sulphur".....	.....	.....	.....	.....	0 $\frac{1}{4}$
Mother coal.....	0 $\frac{1}{2}$	.....	.....	.....	.....
Coal.....	0 4 $\frac{1}{2}$	2 0	2 0	2 8	1 11 $\frac{1}{2}$
Floor, shale.....	.....	.....	.....	.....	.....
Thickness of bed.....	3 8 $\frac{1}{4}$	5 11 $\frac{1}{2}$	6 $\frac{1}{4}$	5 11 $\frac{1}{2}$	6 $\frac{1}{4}$
Thickness of coal sampled.....	3 7 $\frac{1}{2}$	5 1	5 1 $\frac{1}{4}$	5 2 $\frac{1}{4}$	5 3 $\frac{3}{8}$

a Not included in sample.

Section A (sample W20428) was measured on the rib of room 10, off left entry 1, off the main heading.

Section B (sample W20429) was measured at the face of right entry 2, off the main entry.

Section C (sample W20430) was measured on the rib near the face of left entry 2, off the main entry.

Section D (sample W20431) was measured on stump No. 4, right entry 1, off the main entry.

Section E (sample W20432) was measured at the "shoo fly" (cut-through), 100 feet beyond left entry 3, off the main entry.

A composite sample was made by combining face samples W20428, W20429, W20430, and W20432. The results of an ultimate analysis of this sample are shown under laboratory No. 12373.

Note.—At the time of sampling the coal was undercut with machines and by hand, and shot down with FFF and FFFF black powder. At the tippie there was one loading track, with a capacity of 17 empty and 17 loaded cars. There were no screens, the entire output being shipped as run-of-mine. Pickers were employed on the cars in loading. The mine had a capacity of 500 tons a day and an average daily output of about 350 tons, of which the larger part was from advance workings. An increase in the output to about 500 tons was contemplated. There was approximately 400 acres of unmined coal tributary to this entry.

JEFFERSON COUNTY.

SYKESVILLE. SYKESVILLE MINE.

Sample.—Bituminous (coking) coal; Punxsutawney field; analyses Nos. 12455 and 12458, and 12457 and 12471 (p. 93).

Mine.—Sykesville, a shaft mine 1 mile south of Sykesville, on the Bloomsburg & Sullivan Railroad.

Coal bed.—Lower Freeport or D. Carboniferous age, Allegheny formation. Average thickness, 5 feet 6 inches; dip, 2° southeast. The main roof is a strong sandstone which in the south workings is underlain by shale. In the north workings there is no shale and in places the sandstone cuts the coal entirely out. The immediate floor, a hard clay, is separated from a sandstone of poor quality by 4 inches of brown limestone. Cover at points of sampling, about 300 feet.

The bed was measured and sampled at two points in the mine, and the roof coal above the bed was measured and sampled at two points by H. I. Smith and J. T. Ryan, on July 24, 1911, as described below:

Sections of coal bed in Sykesville mine.

Section.....	A	B
Laboratory No.....	12455	12458
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Bony coal.....	0 8½	0 8
Coal.....	0 8½	0 7½
Cannel-like bone.....	0 5	0 3
Coal.....	—	1 11
Bony coal.....	0 1	0 ½
Coal.....	3 1	1 3½
"Mining slate".....	a 0 1½	a 0 1½
Coal.....	0 9	0 9½
Floor, clay.....		
Thickness of bed.....	5 10½	5 8½
Thickness of coal sampled.....	5 9	5 7

a Not included in sample.

Section A (sample 12455) was cut from the pillar at the last cut-through between eighth left main and the back heading, off main south heading.

Section B (sample 12458) was measured at the face of the third right butt heading off the eighth left, off the main south heading.

Sections of roof coal in Sykesville mine.

Section.....	A	B
Laboratory No.....	12457	12471
Shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 1	.. ..
Bony coal.....	0 1	.. ..
Coal.....	0 5 $\frac{3}{4}$	.. ..
Shale.....	a 0 1	.. ..
Coal.....	0 1 $\frac{1}{2}$	.. ..
"Sulphur".....	0 $\frac{1}{2}$	.. ..
Coal.....	0 4	.. ..
Shale.....	a 1 9	.. ..
Coal.....	0 10	0 8
Shale.....	a 0 3	a 0 2 $\frac{1}{2}$
Coal.....	0 7	.. ..
Bone.....	0 2	0 11
Coal.....	0 10 $\frac{1}{2}$	1 $\frac{3}{4}$
Shale.....	a 0 4 $\frac{1}{2}$	a 0 5
Lower Freeport bed.		
Thickness of bed.....	6 $\frac{1}{2}$	.. ..
Thickness of coal sampled.....	3 7	2 7 $\frac{1}{2}$

a Not included in sample.

Section A (sample 12457) was measured in a cavity in the roof between the third right butt and back heading, off the eighth main off the main south heading.

Section B (sample 12471) was measured in a cavity in the roof on the third right butt heading off the eighth left main, about 200 feet from the face of the main heading.

Notes.—The coal is mined by the room-and-pillar system. At the time of sampling the system in vogue was to drive the entries to the boundary line, turning the room necks as the entry was driven, and then drive the rooms and pull the ribs on the retreating system. The coal was undercut with compressed-air punching machines and broken down with a permissible explosive. The coal was picked on the cars. None of the coal was shipped as run-of-mine. Two-thirds of the coal passed over a 2 $\frac{1}{2}$ by 4 inch screen. All the screenings were crushed and coked, about 600 tons being coked daily. There were two loading tracks with a capacity of 15 loaded cars and 15 empty cars. The daily output was 1,200 tons, all from advance workings. About 800 acres of this tract remained to be mined.

LACKAWANNA COUNTY.**DUNMORE. SLOAN MINE.**

Sample.—Anthracite coal; Northern field; analysis No. 11440 (p. 93).

Mine.—Sloan, Dunmore, about 3 miles east of Scranton.

Coal bed.—Dunmore No. 2. Carboniferous age, Allegheny formation. The bed was sampled at one point by N. H. Darton on December 5, 1910. The sample represents 7 feet of coal. The sample was taken in connection with investigations of the occurrence of gases in coal beds.

LUZERNE COUNTY.**PITTSSTON. COLLIERY No. 14.**

Sample.—Anthracite coal; Northern field; analysis No. 11441 (p. 93).

Mine.—Colliery No. 14, a shaft mine 2 miles southwest of Pittston, on the Erie Railroad.

Coal bed.—Pittston. Carboniferous age, Allegheny formation. Thickness, about 13 feet. A sample was taken by N. H. Darton on November 21, 1910, in the last chamber at the end of the Brannagan slope. The sample represents the full thickness of the bed, and does not contain any impurities, being all marketable coal.

Notes.—The mine is opened by slope, drift, and shaft. At the time of sampling the coal was mined by hand. The mine employed about 1,700 men.

WILKES-BARRE. DORRANCE MINE.

Sample.—Anthracite coal; Northern field; analysis No. 11782 (p. 93).

Mine.—Dorrance; a shaft mine in Wilkes-Barre Township about 1 mile west of Wilkes-Barre, with rail connections to the Lehigh Valley Railroad.

Coal bed.—Red Ash. Carboniferous age, Allegheny formation. Thickness, about 12 feet, all of which is marketable coal. Roof, soft sandstone and sandy shale; floor, fire clay. The sample was taken by N. H. Darton at the end of the first west gangway, 600 feet northwest of the shaft, and represents the entire section across the face.

Notes.—The mine is opened by a shaft 1,127 feet deep and the coal is mined by the pillar-and-chamber system. At the time of sampling the mine had an average production of 1,800 tons a day.

SOMERSET COUNTY.

ACOSTA. BELMONT No. 1 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12209, W19536, W19537, W19538, W19539, and W19543 (pp. 93, 94).

Mine.—Belmont No. 1, a drift mine in the Somerset district, one-quarter mile north of Acosta on the Boswell branch of the Baltimore & Ohio Railroad.

Coal bed.—C', or Upper Kittanning. Carboniferous age, Allegheny formation. Average thickness, 3 feet 4 inches. Roof gray-black shale about 18 feet thick; floor, shale with an irregular surface.

The bed was measured and sampled at five points in the mine by G. S. Pope and E. W. Miller, April 26, 1911, as described below:

Sections of coal bed in Belmont No. 1 mine.

Section.....	A	B	C	D	E
Laboratory Nos.....	W19536	W19537	W19538	W19539	W19543
Roof, shale.....	<i>Fl. in.</i>	<i>Fl. in.</i>	<i>Fl. in.</i>	<i>Fl. in.</i>	<i>Fl. in.</i>
Coal.....	0 9½	0 9½	0 5½	0 9½	0 9
Bone and shale.....	a 0 1½	a 0 1	.. ..	0	a 0 1½
Coal.....	.. ..	.. ..	.. ..	0 11½	.. ..
"Sulphur" soft ball.....	.. ..	.. ..	0 ¼	0	.. ..
Coal.....	.. ..	.. ..	0 1½	0 1½	.. ..
"Sulphur" soft ball.....	.. ..	.. ..	.. ..	0	.. ..
Mother coal.....	.. ..	.. ..	0 ¾	.. ..	.. ..
Coal.....	.. ..	.. ..	0 2½	.. ..	.. ..
Coal (breast harder than rest of section).....	.. ..	.. ..	0 3½	.. ..	.. ..
Coal.....	2 7	2 7½	2 7½	1 3	2 4
Floor, shale.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 6	3 5¾	3 9½	3 3½	3 2½
Thickness of coal sampled.....	3 4½	3 4¾	3 9½	3 3½	3 1

a Not included in sample.

Section A (sample W19536) was measured at the face of room 4 off the main heading, 1,300 feet from the mine mouth.

Section B (sample W19537) was measured at the face of the third left entry, 60 feet from the main entry.

Section C (sample W19538) was measured at the face of room 3 off the first right entry.

Section D (sample W19539) was measured at the face of the second left entry, 250 feet from the main entry.

Section E (sample W19543) was measured at the face of the main heading, 1,550 feet from the mine mouth.

Notes.—At the time of sampling the coal was overcut by hand in the top of the bed, and FFFF and FFF black powder was used in breaking it down. There was one loading track with a capacity of 16 cars. There were no screens, the entire output

being shipped as run-of-mine. Pickers were employed on the cars in loading. The coal is soft and friable. The mine was comparatively new, having started shipping coal in October, 1910. It had a capacity of 250 to 300 tons a day with an average daily output of 150 tons, the larger part of which was from advance workings. There was approximately 275 acres of unmined coal tributary to this opening.

BERLIN. CORONET NO. 3 MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 12214, W19532, W19533, W19534, W19535, and W19542 (p. 94).

Mine.—Coronet No. 3, a drift mine in the Somerset district, $1\frac{1}{2}$ miles east of Berlin on the Berlin branch of the Baltimore & Ohio Railroad.

Coal bed.—"Smokeless" or Upper Freeport. Carboniferous age, Allegheny formation. Average thickness, 3 feet 6 inches. Roof, bony coal overlain by sandstone; floor, hard smooth sandstone.

The bed was measured and sampled at five points in the mine by G. S. Pope, April 25, 1911, as described below:

Sections of coal bed in Coronet No. 3 mine.

Section.....	A	B	C	D	E
Laboratory No.	W19532	W19533	W19534	W19535	W19542
Roof, bony coal and sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 10	1 4 $\frac{1}{2}$	1 6	1 0	2 6
Shale.....	0 1	.. ..	.. ..	.. ..	a 0 2 $\frac{3}{4}$
Mother coal.....	.. ..	0 1 $\frac{1}{4}$	0 1 $\frac{1}{2}$	.. ..	.. ..
Coal.....	.. ..	.. ..	.. ..	0 1 $\frac{1}{4}$	0 2 $\frac{1}{4}$
"Sulphur".....	.. ..	.. ..	.. ..	.. ..	0 1 $\frac{1}{4}$
Coal.....	.. ..	1 2	1 0	1 7 $\frac{1}{4}$	0 3
Shale.....	.. ..	a 0 1 $\frac{3}{4}$	a 0 1 $\frac{1}{2}$	a 0 2	.. ..
"Sulphur".....	.. ..	.. ..	.. ..	.. ..	0 1 $\frac{1}{4}$
Coal.....	.. ..	0 1 $\frac{3}{4}$	.. ..	0 3 $\frac{1}{2}$	0 4 $\frac{1}{2}$
Bony coal.....	.. ..	0 1 $\frac{3}{4}$	.. ..	0 3 $\frac{1}{2}$	.. ..
Coal.....	0 10 $\frac{1}{2}$	0 9	0 10 $\frac{1}{2}$	0 6	.. ..
Shale.....	.. ..	.. ..	.. ..	.. ..	a 0 1 $\frac{3}{4}$
Floor, sandstone.	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 9 $\frac{1}{2}$	3 5 $\frac{3}{4}$	3 6 $\frac{1}{2}$	3 6 $\frac{3}{4}$	3 8
Thickness of coal sampled.....	3 9 $\frac{1}{2}$	3 4 $\frac{3}{4}$	3 5	3 4 $\frac{3}{4}$	3 4 $\frac{1}{2}$

a Not included in sample.

Section A (sample W19532) was measured at the face of the eighth left entry, 15 feet beyond room 15 and 2,950 feet from the mouth of the main entry.

Section B (sample W19533) was measured at the face of the sixth right entry, 125 feet from the main heading and 2,500 feet from the mouth of the main entry.

Section C (sample W19534) was measured at the face of room 13, seventh left entry, 2,450 feet from the mouth of the main entry.

Section D (sample W19535) was measured on the pillar between rooms 2 and 3, off the main air course between third and fourth right entries, 1,400 feet from the drift mouth.

Section E (sample W19542) was measured at the face of seventh right entry, 50 feet beyond room 8, 2,800 feet from the mouth of the main entry.

Notes.—At the time of sampling the coal was undercut by hand and shot down with FFF and FFFF black powder. At the tippie there was one loading track, with a capacity of 12 cars. There were no screens, the entire output being shipped as run-of-mine coal. Pickers were employed on the cars in loading.

The coal near the roof gradually becomes harder and merges into bone, without any distinct line of separation between the beds.

The mine was equipped to produce about 300 tons a day, and had an average daily output of 150 tons. The coal was derived from both advance and pillar workings. The mine had been in operation about six years.

CONFLUENCE. LINMER MINE.

Sample.—Bituminous coal; Somerset field; analysis No. 13631 (p. 94).

Mine.—Linmer; a drift mine about $4\frac{1}{2}$ miles southeast of Confluence, on Whites Creek, near Beachly post office, on a branch of the Baltimore & Ohio Railroad.

Coal bed.—C' or Upper Kittanning. Carboniferous (Pennsylvanian) age, Allegheny formation. Average thickness, about 4 feet 3 inches. Roof, sandstone; floor, hard clay.

The bed was measured and sampled by C. T. Lupton on March 29, 1912. The sample represented a 3-foot $6\frac{1}{2}$ -inch section of coal.

The sample was taken at the end of the back subentry, off main entry 1, at a point about 2,500 feet southeast of mine mouth.

ELK LICK. ENGLE MINE.

Sample.—Semibituminous coal; Windber field; analysis No. 13983 (p. 95).

Mine.—Engle; about $2\frac{1}{2}$ miles east of Elk Lick on Pine Run.

Coal bed.—D (?) Carboniferous (Pennsylvanian) age; Allegheny formation. Average thickness, about 3 feet. Roof and floor, shale. The strata at this locality dip about 13° W. and strike N. 38° E.

The bed was measured and sampled by C. T. Lupton on April 2, 1912, as described below:

Section of coal bed in Engle mine.

Laboratory No.	13983
Roof, shale.	<i>Ft. in.</i>
Coal.	2 4
Bone and coal alternating.	^a 0 3
Coal.	0 6½
Floor, shale.	
Thickness of bed.	3 1½
Thickness of coal sampled.	2 10½

^a Not included in sample.

The sample was collected in a room in this "country bank," about 600 feet east of the mine mouth.

ELK LICK. GRASSY RUN NO. 1 MINE.

Sample.—Semibituminous coal; Somerset field; analysis No. 13664 (p. 95).

Mine.—Grassy Run No. 1, about $2\frac{1}{2}$ miles northwest of Elk Lick, on a branch of the Baltimore & Ohio Railroad.

Coal bed.—Four-foot Carboniferous (Pennsylvanian) age; Monongahela formation; about 35 feet stratigraphically above the Pittsburgh bed. Average thickness, about 4 feet 6 inches. Roof, shale 1 foot 3 inches, overlain by "wild coal," floor, sandy bone.

The bed was measured and sampled at one point in the mine by C. T. Lupton on April 1, 1912, as described below:

Section of coal bed in Grassy Run No. 1 mine.

Laboratory No.	13664
Roof, shale.	<i>Ft. in.</i>
Coal.	2 0
Bone.	^a 0 1
Coal.	2 6
Floor, sandy bone.	
Thickness of bed.	4 7
Thickness of coal sampled.	4 6

^a Not included in sample.

The sample was taken in a room about 1,200 feet southwest from the mine mouth.

HOLSOPPLE. LENORE MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 15078, 15079, 15080, 15081, and 15082 (p. 95).

Mine.—Lenore, a shaft mine, one-eighth of a mile north of Holsopple station, on the Baltimore & Ohio Railroad.

Coal bed.—B or Miller. Carboniferous age, Allegheny formation. Thickness, 3 feet to 4 feet, fairly uniform. The bed has no regular shale or sulphur partings. The roof is a sandstone which does not fall or get mixed with the coal. Floor, hard smooth underclay and black "rash." Cover at points of sampling, 150 to 250 feet.

The bed was measured and sampled at four points in the mine by G. H. Deike and Edwin Higgins on November 6, 1912, as described below:

Sections of coal bed in Lenore mine.

Section.....	A	B	C	D
Laboratory No.....	15078	15079	15080	15081
Roof, sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, hard, bright.....	0 7	0 9	0 9	0 8
Coal, dull gray.....	0 1	0 1	0 1	0 1
Coal, soft, bright.....	1 1	1 1	0 11	0 8
"Sulphur".....	a 0 1	.. ..	Streak.	0 1
Coal, soft, bright.....	1 7	2 9	1 2	1 7
Mother coal.....	.. ..	.. ..	0 1	.. ..
Coal, soft, bright.....	.. ..	.. ..	0 3	.. ..
Floor, underclay.....	.. ..	.. ..	.. ..	.. ..
Thickness of coal bed.....	3 4	3 7	3 3	3 1
Thickness of bed sampled.....	3 3	3 7	3 3	3 1

a Not included in sample.

Section A (sample 15078) was measured on rib in right entry 1, 200 feet from main entry.

Section B (sample 15079) was measured at the face of south entry 3.

Section C (sample 15080) was measured 30 feet from the face of the main entry.

Section D (sample 15081) was measured 30 feet from the face of south entry 7.

A composite sample was made by combining samples 15079, 15080, and 15081. The results of an ultimate analysis of this sample are given under laboratory No. 15082.

Notes.—The mine is opened by a shaft 87 feet deep and the coal is mined by the room-and-pillar method. At the time of sampling the coal was undercut by compressed-air cutting machines and by hand and blasted down with FFF black blasting powder. A permissible explosive was used for brushing the floor and roof. The entire output was shipped as run-of-mine. Pickers were employed on the car. There were two loading tracks with a capacity of 20 empty cars and 30 loaded cars. The average daily output was 200 tons with a maximum day's run of 400 tons. The capacity was estimated to be 600 tons a day.

HOLSOPPLE. ONEIDA MINE.

Sample.—Semibituminous coal; Windber field; analyses Nos. 15073, 15074, 15075, 15076, and 15077 (p. 95).

Mine.—Oneida, a slope mine one-eighth of a mile north of Holsopple, on the Baltimore & Ohio Railroad.

Coal bed.—Known as the Upper Kittanning or C', Carboniferous age, Allegheny formation. Thickness, 3 feet 6 inches to 4 feet; average, 3 feet 8 inches. Roof, heavy sandstone; floor, hard limestone. Particles from the roof or floor did not become mixed to any extent with the coal in loading.

The bed was measured and sampled at four points in the mine by G. H. Deike and Edwin Higgins on November 6 and 7, 1912, as described below:

Sections of coal bed in Oneida mine.

Section.....	A		B		C		D	
Laboratory No.....	15073		15074		15075		15076	
Roof, sandstone.....	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Coal, soft, bright, friable.....	0	9	0	11	0	11½	1	0
Coal, hard, gray, bony.....	0	4	0	2	0	½	0	1
Coal, bright, friable.....	..	..	..	..	0	2	..	..
Coal, hard, gray.....	..	..	..	..	0	6½	..	..
Coal, hard, bright.....	2	3	1	7	1	9½	2	11
"Sulphur" streak.....	..	..	0	½	0	½	..	..
Coal, hard, bright.....	..	..	0	11	..	..	..	..
Coal.....	..	..	..	..	0	1	..	..
Floor, limestone.....	..	..	..	..	..	..	..	..
Thickness of bed.....	3	4	3	5½	3	7½	4	0
Thickness of coal sampled.....	3	4	3	5½	3	7½	4	0

Section A (sample 15073) was measured on a pillar in room 6 off left entry 5

Section B (sample 15074) was measured at the face of room 3 off left entry 6.

Section C (sample 15075) was measured 15 feet from face of left entry 5.

Section D (sample 15076) was measured at the face of room 23 off left entry 3.

A composite sample was made by mixing face samples 15074, 15075, and 15076. The results of an ultimate analysis of this sample are given under laboratory No. 15077.

Notes.—At the time of sampling the coal was undercut by hand and with compressed-air punching machines and shot down with FFF black powder. Permissible explosives were used for blasting the roof or floor. The tippie was used both by the Oneida and Lenore mines but the coal was not mixed, as each mine had a separate dump. All coal was shipped as run-of-mine. Pickers were employed on the cars. There were two loading tracks at the tippie with a capacity of 20 empty and 30 loaded railroad cars. The average daily output was 200 tons, the maximum day's run being 300 tons.

JEROME. JEROME NO. 2 MINE

Sample.—Semibituminous coal; Windber field; analyses Nos. 12210, W19638, W19639, and W19642 (p. 95).

Mine.—Jerome No. 2, a shaft mine in the Somerset district, at Jerome, on the Somerset & Cambria branch of the Baltimore & Ohio Railroad.

Coal bed.—C', or Upper Kittanning, Carboniferous age, Allegheny formation. The coal has an average thickness of 6 feet (including 6 inches of bone). The bone and shale are persistent at the top of the bed and irregular in the body of the bed. The roof is a bony coal averaging 6 inches in thickness overlain by a limestone capping. Floor, hard smooth sandstone.

The bed was measured and sampled at one point in the mine on May 22, 1911, and at 3 points, on April 27, 1911, by G. S. Pope, as described below:

Sections of coal bed in Jerome No. 2 mine.

Section.....	A		B		C	
Laboratory No.....	W19638		W19639		W19642	
Roof, bony coal and limestone.....	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Bone and shale.....	a 0	5½	a 0	6½	a 0	4
Coal.....	1	1½	1	3	1	0
Bone, shale, and coal.....	a 0	9	a 0	1	a 0	11
Coal.....	4	2	4	2	3	9½
Floor, sandstone, hard.....	..	..	..	..	..	..
Thickness of bed.....	6	6	6	½	6	½
Thickness of coal sampled.....	5	3½	5	5	4	9½

a Not included in sample.

Section A (sample W19638) was measured at the face of south entry 7 off east entry 1½.

Section B (sample W19639) was measured at the face of south entry 4 off east entry 2.

Section C (sample W19642) was measured at the face of east entry 2.

Sample 12210 was measured at the face of east entry 1.

A composite sample was made by combining face samples W19638, W19639, and W19642. The results of an ultimate analysis of this sample are shown under laboratory No. 12224.

Notes.—In April, 1911, the coal was undercut with machines and by hand and was broken down with a permissible explosive. The mine was well equipped. The tippie had 4 loading tracks with a capacity of 80 cars. The coal was screened with bar screens 10 feet long, with 3-inch openings; 75 per cent of the coal passed through. The coal was hand picked both on the conveyor and on the car in loading. The mine had a capacity of 1,700 tons a day with an average daily output of 1,020 tons, which was largely from advance workings. It was planned to increase the production to about 1,500 tons. The operating company owned or controlled about 1,000 railroad cars.

PINEHILL. CONSOLIDATION No. 112 MINE.

Sample.—Semibituminous coal; Somerset field; analyses Nos. 13981, 13982, and 14037 (p. 96).

Mine.—Consolidation No. 112, at Pinehill, on the Berlin branch of the Baltimore & Ohio Railroad.

Coal bed.—"Little Pittsburgh." Carboniferous (Pennsylvanian) age; in the upper part of the Conemaugh formation, about 147 feet stratigraphically below the Pittsburgh bed. Average thickness, about 3 feet 4 inches. Strata are flat-lying, with a maximum dip of about 5 per cent. Roof, shale grading into sandstone above; floor, carbonaceous shale with some clay.

The bed was sampled and measured by C. T. Lupton at two points on April 3, 1912, as described below:

Sections of coal bed in Consolidation No. 112 mine.

Laboratory Nos.	13981	13982
Roof, sandy shale, grading into sandstone above.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal (usually not mined).....	-- --	a 0 7
Shale.....	-- --	a 0 8
Coal.....	2 6	2 0
Bone, variable.....	0	a 0 ½
Coal, with occasional small lenses of pyrite.....	1	1 1
Floor, shale and clay.....		
Thickness of bed.....	3 7	4 4½
Thickness of coal sampled.....	3 7	3 1

a Not included in sample.

Sample 13981 was taken in room 44, right subentry 8 off the west main entry, about 3,600 feet west of the mine mouth.

Sample 13982 was taken in room 8, right subentry 1 off left entry 12, about 5,000 feet southwest of the mine mouth.

A composite sample was made by combining face samples 13981 and 13982. The results of an ultimate analysis of this sample are shown under laboratory No. 14037.

PINEHILL. CONSOLIDATION No. 113 MINE.

Sample.—Semibituminous coal; Somerset field; analysis No. 13984 (p. 96).

Mine.—Consolidation No. 113; at Pinehill, on the Berlin branch of the Baltimore & Ohio Railroad.

Coal bed.—"Stoner." Carboniferous age (Pennsylvanian) age; Conemaugh formation; about 290 feet stratigraphically below the Pittsburgh bed. Average thickness, about 4 feet. Roof, shale grading upward into sandstone.

The sample was collected by C. T. Lupton on April 3, 1912, from a mine car brought directly from room 2, right entry 10, about 3,700 feet southwest from the mine mouth. Information regarding the thickness of the bed as described below was furnished by C. W. Hoffa, superintendent of the mine.

Section of coal bed in Consolidation No. 113 mine, at Pinehill.

Roof, shale, grading into sandstone above.	<i>Ft.</i>	<i>in.</i>
Coal.....	3+	0
Shale (variable).....	0	3
Coal.....	0	11
Floor (not stated).		
Thickness of bed.....	4	2

RALPHTON. RALPHTON No. 3 MINE.

Sample.—Semibituminous coal; Somerset field; analyses Nos. W19627, W19628, W19629, W19630, and W19631 (p. 96).

Mine.—Ralphton No. 3, a drift mine one-half mile east of Ralphton on the Boswell branch of the Cambria and Somerset division of the Baltimore & Ohio Railroad.

Coal bed.—C' or Upper Kittanning. Carboniferous age, Allegheny formation. The coal has an average thickness of 3 feet 5 inches. The roof is a strong gray shale between which and the main coal bed is a seam of roof coal 3 to 4 inches thick. The floor is a smooth, hard limestone.

The bed was measured and sampled at five points in the mine by G. S. Pope on April 29, 1911, as described below:

Sections of coal bed in Ralphton No. 3 mine.

Section.....	A	B	C	D	E
Laboratory No.....	W19627	W19628	W19629	W19630	W19631
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Shale, bone, and coal.....	a 0 4½	a 0 3	a 0 4	a 0 3	a 1 4
Coal.....	.. ..	0 1	.. ..	.. ..	.. ..
Shale.....	a 0 4	0 1	.. ..	.. ..	.. ..
Coal.....	.. ..	0 9	0 9½	.. ..	0 7½
Bone.....	.. ..	0 ½	0 ½	.. ..	0 ½
Coal.....	3 3	2 7	2 6½	3 6½	2 8½
Floor, limestone.					
Thickness of bed.....	3 11½	3 8½	3 8½	3 9½	4 8½
Thickness of coal sampled.....	3 3	3 5¼	3 4½	3 6½	3 4½

a Not included in sample.

Section A (sample W19627) was measured at the third crosscut off south entry 2, about 3,050 feet from the mine mouth.

Section B (sample W19628) was measured at the face of room 11 off the straight main entry, about 3,150 feet from the mine mouth.

Section C (sample W19629) was measured at the face of room 4 off right entry 6, about 2,800 feet from the mine mouth.

Section D (sample W19630) was measured at the face of room 29 off right heading 4, about 2,900 feet from the mine mouth.

Section E (sample W19631) was measured 20 feet inside the third crosscut off south entry 3, about 3,700 feet from the mine mouth.

Notes.—At the time of sampling the coal was undercut by hand and shot down with FFF and FFFF black powder. The tippie had one loading track with a capacity of 22 cars. There were no screens, the entire output being loaded as run-of-mine. Pickers were employed on the cars in loading. The mine had a capacity of 1,000 tons and an average daily output of 850 tons, most of which was from advance workings.

RALPHTON. RALPHTON No. 4 MINE.

Sample.—Semibituminous coal; Somerset field; analyses Nos. 12202, 12218, W19632, W19633, W19635, W19636, and W19637 (p. 97).

Mine.—Ralphton No. 4, a drift mine, 1¼ miles north of Ralphton, on the Baltimore & Ohio Railroad.

Coal bed.—C' or Upper Kittanning. Carboniferous age, Allegheny formation. The coal has an average thickness of 3 feet 10 inches and is relatively free from partings. Roof, firm, smooth shale; floor, smooth, hard limestone.

The bed was measured and sampled at five points in the mine by G. S. Pope on April 28, 1911, as described below:

Sections of coal bed in Ralphton No. 4 mine.

Section.....	A	B	C	D	E
Laboratory No.....	W19632	W19633	W19635	W19636	W19637
Roof, smooth shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 3	3 10½	3 7½	3 7	3 11
Hard gray coal inclined to bone.....	0 1	.. ..	.. ..	.. ..	.. ..
Coal.....	2 7½	.. ..	.. ..	.. ..	.. ..
Floor, hard smooth limestone.....					
Thickness of bed.....	3 11½	3 10½	3 7½	3 7	3 11
Thickness of coal sampled.....	3 11½	3 10½	3 7½	3 7	3 11

Section A (sample W19632) was measured on a pillar between the south main heading and the air course opposite right entry 1.

Section B (sample W19633) was measured at the face of the south main entry.

Section C (sample W19635) was measured at the face of room 7 off the south main entry.

Section D (sample W19636) was measured on pillar 1 at the second "shoo-fly" (cross-over) off main entry 1.

Section E (sample W19637) was measured at the face of left entry 4 off the south main entry.

Notes.—At the time of sampling the coal was undercut in the lower part of the bed by hand and was shot down with black powder. The tippie had one loading track with a capacity of 15 railroad cars. There were no screens, the output being loaded as run-of-mine. The mine had a capacity of 450 tons and an average daily output of 400 tons.

WASHINGTON COUNTY.

AVELLA. PENOBSCOTT MINE.

Sample.—Bituminous coal; Pittsburgh field; analyses Nos. 15673 and 15674 (p. 97).

Mine.—Penobscott, a drift mine, 2 miles west of Avella, on Wabash-Pittsburgh Terminal Railway, near State line.

Coal bed.—Pittsburgh. Carboniferous age, Monongahela formation. Thickness averages about 4½ feet where measured. In this vicinity this coal bed has been locally eroded and replaced by sandstone. The roof left in mining is coal, the top clay above the main bed of coal being weak.

The bed was measured and sampled at two points in the mine by D. D. Condit on January 8, 1913, as described below:

Sections of bed in Penobscott mine.

Section.....	A	B
Laboratory No.....	15673	15674
Roof, coal 3 to 6 inches.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Clay.....	a 1 1	a 1 0
Coal.....	2 2½	2 3
Clay.....	a 0 ½	a 0 ½
Coal.....	a 0 3¾	a 0 3½
Clay.....	a 0 ½	a 0 ½
Coal.....	1 8½	1 7
Floor, clay and shale.....		
Thickness of bed.....	5 4½	5 2
Thickness of coal sampled.....	3 11	3 10

a Not included in samples.

Section A (sample 15673) was measured in room 15, eighth left entry off main entry, 2,500 feet northwest of mine mouth. Cover at point of sampling, 80 feet.

Section B (sample 15674) was measured in a room off seventh right entry, 3,100 feet northeast of mine mouth. Cover, 70 feet.

BAIRD. SCHOENBERGER MINE.

Sample.—Bituminous coal; Pittsburgh field; analysis Nos. 11164, 11165, 11166, 11167, 11168, 11169 and 11170 (pp. 97, 98).

Mine.—Schoenberger, a drift mine at Baird, a station on the Monongahela division of the Pennsylvania Railroad.

Coal bed.—Pittsburgh, Carboniferous age, Monongahela formation. Average thickness, 5 feet 10 inches. The roof is a "draw slate" 8 inches thick, above which is a shale; 15 feet above the shale is the main cap rock. The floor is a shale, below which is a limestone. Dip, about 1 per cent southwest.

The bed was sampled and measured at six points in the mine by A. A. Straub on November 3, 1910, as described below:

Sections of coal bed in Schoenberger mine.

Section.....	A		B		C		D		E		F	
Laboratory No.....	11164		11165		11166		11167		11168		11169	
Roof, slate.....	<i>Ft.</i>	<i>In.</i>	<i>Ft.</i>	<i>In.</i>	<i>Ft.</i>	<i>In.</i>	<i>Ft.</i>	<i>In.</i>	<i>Ft.</i>	<i>In.</i>	<i>Ft.</i>	<i>In.</i>
Coal, bright.....	3	4 $\frac{3}{8}$	2	7 $\frac{3}{8}$	2	1	2	2 $\frac{1}{2}$	1	10 $\frac{1}{2}$	3	2 $\frac{3}{4}$
"Sulphur" band.....	..	..	a0	0	0	11 $\frac{1}{2}$	a0	0	0	7 $\frac{1}{4}$	..	..
Coal, bright.....	..	..	0	9 $\frac{1}{2}$	0	11 $\frac{1}{2}$	0	2 $\frac{1}{2}$	0	7 $\frac{1}{4}$	..	..
Shale band.....	a0	1 $\frac{1}{2}$	..	..	a0	..	..	..	..	..	..	..
"Sulphur" band.....	..	..	0	1 $\frac{1}{2}$	..	..	0	1 $\frac{1}{4}$	0	1 $\frac{1}{8}$	..	..
Coal, bright.....	0	2 $\frac{1}{2}$	0	2 $\frac{3}{8}$	0	2 $\frac{3}{4}$	0	1	..	..	..	..
"Sulphur" band.....	..	..	..	..	..	..	0	..	..	..	..	..
Coal, bright.....	..	..	..	..	..	..	0	8 $\frac{3}{4}$	..	9 $\frac{1}{8}$	..	..
Shale band.....	a0	3	a0	1 $\frac{1}{2}$	a0	..	a0	0	a0	..	a0	3 $\frac{3}{8}$
Coal, bright.....	..	..	0	1 $\frac{1}{2}$	..	..	0	3	0	2 $\frac{1}{4}$	0	1 $\frac{1}{2}$
"Sulphur" band.....	..	..	0	..	..	..	..	..	..	..	..	..
Shale band.....	..	..	..	..	..	..	a0	..	a0	..	a0	1 $\frac{1}{4}$
Coal, bright.....	..	..	1	2	..	..	0	6 $\frac{1}{4}$	1	6 $\frac{1}{4}$	..	..
"Sulphur" band.....	..	..	0	..	..	..	0	1	0	..	..	..
Coal, bright.....	1	10 $\frac{1}{2}$	0	9 $\frac{1}{2}$	1	10 $\frac{1}{2}$	1	5 $\frac{1}{8}$	0	5 $\frac{1}{8}$	1	9
Floor, shale and limestone.....	..	..	..	..	..	..	..	..	..	..	..	..
Thickness of bed.....	5	6 $\frac{1}{4}$	5	9 $\frac{1}{8}$	5	2 $\frac{3}{4}$	5	7 $\frac{1}{2}$	5	6 $\frac{3}{4}$	5	2
Thickness of coal sampled.....	5	5	5	8 $\frac{1}{2}$	5	2 $\frac{3}{8}$	5	6 $\frac{1}{2}$	5	5 $\frac{1}{2}$	5	5

a Not included in sample.

Section A (sample 11164) was measured at the face of room 10, entry 32 off face entry 12, about 4,000 feet southeast of the mine mouth.

Section B (sample 11165) was measured at the face of room 4, entry 32 off face entry 11, about 4,000 feet southeast of the mine mouth.

Section C (sample 11166) was measured at the face of the right main entry, about 7,000 feet south of the mine mouth.

Section D (sample 11167) was measured at the face of room 11, entry 32 off the right main entry, about 6,000 feet south of the mine mouth.

Section E (sample 11168) was measured at the face of face entry 11, about 4,800 feet southeast of the mine mouth.

Section F (sample 11169) was measured on a pillar, in right entry 29 off the main entry, about 5,500 feet south of the mine mouth.

Notes.—The coal is mined by the double entry, room-and-pillar system. At the time of sampling electric chain-cutting machines were used and the coal was broken down with FF black powder. The mine had a capacity of about 3,000 tons a day, 75 per cent of which was from advance workings. There were 4 loading tracks with a capacity of 65 cars at the tippie. Pickers were employed on the cars when coal was being loaded. About 10 per cent of the coal was shipped as run-of-mine and remainder was screened to various commercial sizes. There was about 250 acres of unmined coal tributary to this drift mouth.

FINLEYVILLE. CINCINNATI MINE.

Sample.—Bituminous coal; Pittsburgh field; analyses Nos. 17082, 17083, 17084, and 17085 (p. 98).

Mine.—The Cincinnati mine is opened by a drift about two miles northeast from Courtney and a manway at Mingo 2 miles southeast of Finleyville.

Coal bed.—Pittsburgh, Carboniferous age, Monongahela formation. Thickness, 4 feet 8 inches to 6 feet 8 inches, fairly uniform. In the center of the bed are two characteristic clay partings about three inches apart. The roof is a "draw slate," over which there is a roof coal and shale. The floor is an underclay, beneath which is a limestone bedrock.

The bed was measured and sampled at three points in the mine by H. I. Smith, H. D. Mason, jr., and W. A. Raudenbush on May 7, 1913, as described below:

Sections of coal bed in Cincinnati mine.

Section.....	A	B	C
Laboratory No.....	17082	17083	17084
Roof, "draw slate."	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 4½	1 6½	1 7½
Bony coal.....	0	0	0 1
Coal.....	1 9½	0 10	1 7
Mother coal and "sulphur".....	0	0	.. ..
Coal.....	0 3½	1	.. ..
Shale binder.....	Streak.	a 0	0 ½
Coal.....	0 3½	a 0 3½	0 2½
Shale binder.....	0 ½	a 0	0 ¾
"Sulphur" ball on one side.....	.. ..	.. ..	0 3
Coal.....	0 7½	0 2	0 3½
Mother coal.....	0 ½	0 ½	0 ½
Coal.....	1 2	1 9	1 9
Bottom coal.....	.. ..	a 0 4	0 4½
Floor, underclay.....	.. ..	.. ..	.. ..
Thickness of bed.....	5 8½	6 1½	6 3½
Thickness of coal sampled.....	5 8½	5 5½	6 3½

a Not included in sample.

Section A (sample 17082) was measured 60 feet outby the last cut-through on butt entry 6 off face entry 14, about 6,200 feet northwest of the mouth of Mingo slope entry.

Section B (sample 17083) was measured 60 feet inby room 2 on butt entry 10 off face entry 14, about 6,800 feet northwest of the mouth of Mingo slope entry.

Section C (sample 17084) was measured inby the first crosscut on butt entry 12 off face entry 14, about 7,400 feet northwest of the mouth of Mingo slope entry.

A composite sample was made by mixing face samples 17082, 17083, and 17084. The results of an ultimate analysis of this sample are given under laboratory No. 17085.

Notes.—The coal is mined by the room-and-pillar system. At the time of sampling it was undercut with electric cutting machines in the bottom of the bed and was broken down with permissible explosives. The cuttings were loaded out with the coal. The "draw slate" is treacherous and must be broken down and loaded out after each cut of coal. The entire output of the mine went to a tippie on the Monongahela River. Although this mine is one of the first on the Monongahela River it still contained considerable coal.

MONONGAHELA CITY. CATSBURG MINE.

Sample.—Bituminous coal; Pittsburgh field; analyses Nos. 11157, 11158, 11159, 11160, 11161, 11162, 11163, 11172, 11541, and 12281 (pp. 98, 99.)

Mine.—Catsburg, a drift mine one-fourth of a mile south of Monongahela City with railroad connections to the Monongahela River division of the Pennsylvania lines.

Coal bed.—Pittsburgh. Average thickness, 5 feet 6 inches. Dip, 1 per cent southeast. The roof is a "draw slate," about 8 inches thick, above which is a fair quality

of roof coal 6 to 12 inches thick. Floor, soft fire clay. The bed was measured and sampled at six points in the mine by J. J. Rutledge and A. A. Straub on November 1, 1910, as described below:

Sections of coal bed in Catsburg mine.

Section.....	A	B	C	D	E	F
Laboratory No.....	11157	11158	11159	11160	11161	11162
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bright and hard.....	2 3	2 11 $\frac{1}{2}$	2 9 $\frac{1}{2}$	3 1	2 8 $\frac{1}{2}$	3 2
"Sulphur" band.....	0 $\frac{1}{2}$	.. ..	.. ..	.. ..	.. ..	.. ..
Coal.....	0 8 $\frac{1}{2}$	.. ..	.. ..	.. ..	.. ..	.. ..
Shale, dark.....	a 0 $\frac{1}{2}$	a 0 ..	a 0 ..	a 0 $\frac{1}{2}$	a 0 ..	a 0 ..
Coal, bright.....	0 2 $\frac{1}{2}$	0 2 $\frac{1}{2}$	0 2 $\frac{1}{2}$	0 2 $\frac{1}{2}$	0 2 $\frac{1}{2}$	0 2 $\frac{1}{2}$
Shale, dark.....	a 0 $\frac{1}{2}$	a 0 1 $\frac{1}{2}$	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$	a 0 ..	a 0 ..
Coal, bright.....	2 2 $\frac{1}{2}$	1 1 $\frac{1}{2}$	1 1 $\frac{1}{2}$	2 2	2 5 $\frac{1}{2}$	0 9 $\frac{1}{2}$
"Sulphur" band.....	.. ..	.. ..	0 ..	.. ..	.. ..	0 ..
Coal, bright.....	.. ..	.. ..	0 11 $\frac{1}{2}$	.. ..	.. ..	1 5 $\frac{1}{2}$
Floor, fire clay.....	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	5 6	4 5 $\frac{1}{2}$	5 2 $\frac{1}{2}$	5 6 $\frac{1}{2}$	5 6	5 8 $\frac{1}{2}$
Thickness of coal sampled.....	5 5	4 3 $\frac{1}{2}$	5 1 $\frac{1}{2}$	5 5 $\frac{1}{2}$	5 4 $\frac{1}{2}$	5 7 $\frac{1}{2}$

a Not included in sample.

Section A (sample 11157) was measured at the face of sixty-sixth butt entry, 2 $\frac{1}{2}$ miles northeast of the mine mouth.

Section B (sample 11158) was measured on the rib of room 17, seventy-fifth entry, 2 $\frac{1}{4}$ miles northeast of the mine mouth.

Section C (sample 11159) was measured at the face of room 23, seventy-ninth butt entry, 2 $\frac{1}{4}$ miles northeast of the mine mouth.

Section D (sample 11160) was measured on the chain pillar at room 46, seventy-fourth butt entry, 2 $\frac{1}{2}$ miles northwest of the mine mouth.

Section E (sample 11161) was measured at the face of the north second main entry, 2 $\frac{1}{2}$ miles north of the mine mouth.

Section F (sample 11162) was measured at the face of room 101 on sixty-eighth butt entry, 2 $\frac{1}{4}$ miles northwest of the mine mouth.

Three cars of slack coal from this mine were shipped to the Pittsburgh experiment station for testing purposes. The car samples are designated as follows: Pittsburgh No. 113, laboratory No. 11172; Pittsburgh No. 131, laboratory No. 11541; Pittsburgh No. 181, laboratory No. 12281.

Notes.—The coal is mined by the double-entry, room-and-pillar system. At the time of sampling electric chain-cutting machines were used. The coal was shot down with FFF black powder, dynamite being used for brushing the roof. The mine had a daily production of about 875 tons, which was derived both from advance workings and pillars. Only a little of the coal was shipped as run-of-mine. There were 3 loading tracks, with a capacity of about 45 cars, at the tippie. Pickers were employed both in the mine and on the railroad cars when coal was loaded. About 33 per cent of the coal produced was screenings. There was about 1,400 acres of unmined coal tributary to this opening.

WESTMORELAND COUNTY.

GREENSBURG. No. 4 MINE.

Sample.—Bituminous coal; Pittsburgh field; Greensburg district; analysis Nos. 12265 and 12853 (p. 99.)

Mine.—No. 4; 4 miles north of Greensburg.

Coal bed.—Pittsburgh. Carboniferous age, Monongahela formation. The coal from this mine was sampled by E. R. Linkenhoker on June 7 and November 13, 1911, respectively, while the coal was being unloaded at the Bureau of Mines testing plant, Pittsburgh, Pa.

Sample 12265 represented a carload of lump coal (Pittsburgh No. 178).

Sample 12853 represented a carload of lump coal (Pittsburgh No. 254).

LUCESCO. LUCESCO MINE.

Sample.—Bituminous coal; Pittsburgh field; analyses Nos. 12393, 12394, 12395, 12396, and 12397 (p. 99).

Mine.—Lucesco, a drift mine in the Allegheny River district, near Lucesco, a post office at Kiskiminetas Junction, on the Conemaugh and Allegheny divisions of the Pennsylvania Railroad.

Coal bed.—Known as the Upper Freeport or E. Carboniferous age, Allegheny formation. The thickness is rather variable, ranging from 2 to 4 feet. The roof near the opening is a sandy shale of variable thickness, averaging $1\frac{1}{2}$ feet. At the points where the samples were taken the roof is sandstone. The floor is an underclay, $1\frac{1}{2}$ to 3 feet thick, underlain by limestone. The floor is taken up in the inner workings to get the necessary height and the material is packed in gob walls along the entries. The cover increases rapidly from the outcrop and rises to 300 feet at places.

The bed was measured and sampled at four points in the mine by L. M. Jones, on June 29, 1911, as described below:

Sections of the coal bed in the Lucesco mine.

Section.....	A	B	C	D
Laboratory No.....	12393	12394	12395	12396
Roof, hard sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal with fine "sulphur" streaks.....	0 3 $\frac{1}{2}$	1 4	-- --	-- --
Mother coal.....	-- --	0 $\frac{1}{2}$	-- --	-- --
Coal, hard.....	1 10 $\frac{1}{2}$	1 1 $\frac{1}{2}$	2 10	2 8 $\frac{1}{2}$
Mother coal or shale.....	0 $\frac{1}{2}$	0 $\frac{1}{2}$	-- --	a 0 $\frac{1}{2}$
Coal.....	0 1	0 9 $\frac{3}{4}$	-- --	0 2
Shale and coal.....	a 0 1	a 0 1 $\frac{1}{2}$	a 0 1	0 $\frac{1}{2}$
Coal.....	0 6	0 4 $\frac{1}{2}$	0 6	0 3
Shale and "sulphur".....	a 0 $\frac{1}{2}$	-- --	a 0 2	a 0 1 $\frac{1}{2}$
Coal.....	0 7	-- --	0 4	0 4
Floor, fire clay.....				
Thickness of bed.....	3 6	3 10	3 11	3 8
Thickness of coal sampled.....	3 4 $\frac{1}{2}$	3 8 $\frac{1}{2}$	3 8	3 6

a Not included in sample.

Section A (sample 12393) was cut from the face of the ninth left entry, 4,000 feet south of the mine mouth.

Section B (sample 12394) was cut from the face of the fifth left entry, 165 feet beyond room 46, 3,600 feet from the mine mouth.

Section C (sample 12395) was cut from the face of room 48, first right entry, 3,200 feet southeast of the mine mouth.

Section D (sample 12396) was cut from the face of room 20, third right entry, 2,300 feet southeast of the mine mouth.

A composite sample was made by mixing face samples 12393, 12394, 12395, and 12396. The results of an ultimate analysis of this sample are shown under laboratory No. 12397.

Notes.—At the time of sampling, the coal at this mine was undercut by hand and blasted with FFF black powder. From the mine opening 40 feet above the tippie floor a gravity incline led to the tippie, which extended over the loading track and the main line of the Pennsylvania Railroad, and was equipped to load the engines on the latter track. The daily output averaged 300 tons a day.

MADISON. KEYSTONE MINE.

Sample.—Bituminous coal, Pittsburgh field. Analyses Nos. 16270 and 16271 (p. 99).

Mine.—Keystone, a shaft mine at Madison.

Coal bed.—Pittsburgh. Carboniferous age, Monongahela formation. Thickness about $6\frac{1}{2}$ feet.

Sample 16270 was taken from a car of slack and sample 16271 from a car of run-of-mine coal, by E. R. Linkenhoker while the cars were being unloaded at the Pittsburgh testing station.

SOUTH DAKOTA.

HARDING COUNTY.

BUFFALO. HILTON MINE.

Sample.—Lignite. Northwestern South Dakota field; analysis No. 13221 (p. 100.)

Mine.—Hilton, a drift mine near center of sec. 6, T. 20 N., R. 5 E., 10 miles north of Buffalo.

Lignite bed.—No name. Cretaceous or Tertiary age; Lance formation.

The bed was measured and sampled by E. M. Parks on October 4, 1911, as described below:

Section of lignite bed in the Hilton mine.

Laboratory No.....	13221
	<i>Ft. in.</i>
Roof, lignite.....	a 1 11
Clay, gray.....	a 0 6
Lignite.....	2 10
Clay.....	a 0 1½
Lignite, brown, woody.....	4 4
Clay (with water) reported.....	a 2 0
Lignite, reported.....	a 2 0
Floor, clay.....	
Thickness of bed.....	13 8½
Thickness of lignite sampled.....	7 2

a Not included in sample.

Note.—The mine was seldom worked. The sample was collected at the face of the drift entry, 120 feet from the outcrop at the mine mouth. The sample was fairly dry.

BUFFALO. OPEN PIT.

Sample.—Lignite. Northwestern South Dakota field; analysis No. 13220 (p. 100.)

Mine.—Mendenhall; 18 miles east of Buffalo, in sec. 1, T. 17 N., R. 7 E.

Lignite bed.—Upper Cretaceous or Tertiary age; Lance formation.

The bed was measured and sampled by E. M. Parks on August 18, 1911, as described below:

Section of lignite bed in open prospect.

Laboratory No.....	13220
	<i>Ft. in.</i>
Dirt, bituminous with coaly streaks a.....	0 5½
Lignite, tough.....	0 5
Lignite, bony.....	0 2
Lignite, tough.....	0 9
Bone.....	0 1
Lignite.....	0 7
Clay.....	0 1
Lignite, tough, with two thin sandy partings.....	4 ¾
Clay a.....	
Thickness of bed.....	6 7
Thickness of lignite sampled.....	6 1½

a Not included in sample.

The sample was collected from the face of prospect after about two feet of lignite had been removed, and was fairly dry.

Note.—This prospect was seldom worked.

BUFFALO. OPEN PIT.

Sample.—Lignite. Northwestern South Dakota field; analysis No. 13222 (p. 100.)

Mine.—Mendenhall; 18 miles east of Buffalo in sec. 1, T. 17 N., R. 7 E.

Lignite bed.—Upper Cretaceous or Tertiary age, Lance formation.

The bed was measured and sampled by E. M. Parks on August 17, 1911, as described below:

Section of lignite bed in open prospect.

Laboratory No.....	13222
	<i>Ft. in.</i>
Clay, brown.....	a 2 5
Lignite.....	a 0 4
Clay, laminated.....	a 1 1
Lignite, dirty.....	a 0 6
Dirt, bituminous.....	a 0 7
Lignite with bone interbedded.....	1 7
Shale with lignite interbedded.....	a 0 3
Lignite, dirty.....	0 3½
Shale.....	0 ½
Lignite.....	4 4
Thickness of bed.....	11 5
Thickness of lignite sampled.....	6 3

a Not included in sample.

The sample was collected from the face of the stripping after about 2 feet of lignite had been removed.

Note.—This prospect was seldom worked.

RALPH. NEWCOMB MINE.

Sample.—Lignite; Perkins and Harding counties field; analysis No. 15062 (p. 100).

Mine.—Newcomb, an open-pit mine, in the SW. ¼ sec. 10, T. 20 N., R. 9 E., 5 miles southeast of Ralph and about 28 miles south of Reeder, N. Dak., on the Chicago, Milwaukee & St. Paul Railroad.

Lignite bed.—Designated the Widow Clark bed. Tertiary (?) age, Ludlow lignitic member of the Lance formation. It is the most important bed of lignite in that part of Harding County. Its average thickness in T. 20 N., R. 9 E., is about 4 feet, but it varies from 2 feet 8 inches in sec. 9 to 10 feet 10 inches in sec. 10. It is usually of good quality with very small amounts of impurities. It is tough and slightly woody, when freshly mined, but slacks readily upon exposure to air. It is used entirely for domestic purposes.

The bed was measured and sampled October 16, 1912, by J. B. Reeside, jr., as shown below:

Section of lignite bed in the Newcomb mine.

Laboratory No.....	15062
	<i>Ft. in.</i>
Roof, shale.....	a 0 6
Lignite, dirty.....	a 0 1
Parting, shale.....	a 0 1
Lignite, dirty.....	a 0 1
Parting, shale.....	a 0 1
Lignite, fine quality.....	10 1
Floor, not stated.....	
Thickness of bed.....	10 10
Thickness of lignite sampled.....	10 1

a Not included in sample.

Notes.—The lignite is mined by stripping, and the sample was collected from the face of the bed, which was somewhat weathered.

PERKINS COUNTY.

LODGEPOLE. NELSON MINE.

Sample.—Lignite; northwestern South Dakota field; analysis 14354 (p. 100).

Mine.—Nelson; 3 miles southwest of Lodgepole, and about 18 miles south of the Chicago, Milwaukee & St. Paul Railway, in sec. 29, T. 21 N., R. 12 E.

Lignite bed.—Tertiary age, Fort Union formation. Thickness of part sampled, 7 feet. Neither the top nor the bottom of the bed was exposed.

The sample was collected in the entry 140 feet northwest of the entry mouth, by E. R. Lloyd and E. G. Woodruff, on July 3, 1912.

STROOL. JONES MINE.

Sample.—Lignite; northwestern South Dakota field; analysis No. 12453 (p. 100).

Mine.—Jones; a drift mine 6 miles northwest of Strool, in sec. 35, T. 19 N., R. 10 E.

Lignite bed.—The lignite bed is of Tertiary(?) age, Lance formation, and showed the following section:

Section of lignite bed in Jones mine, 6 miles northwest of Strool.

Laboratory No.....	12453
Roof, sandy shale.....	<i>Ft. in.</i>
Lignite.....	a 1 2
Shale, sandy.....	a 0 ½
Lignite.....	4 2
Floor, clay.....	
Thickness of bed.....	5 4½
Thickness of lignite sampled.....	4 2

a Excluded from sample.

Note.—The lignite is brown and woody. Section and sample were taken at end of main entry by D. E. Winchester, July 22, 1911.

STROOL. KNUDSEN MINE.

Sample.—Lignite; northwestern South Dakota field; analysis No. 12454 (p. 100).

Mine.—Knudsen; a drift mine 5 miles southwest of Strool, in sec. 2, T. 17 N., R. 10 E.

Lignite bed.—The lignite bed is of Tertiary(?) age, Lance formation, and has the following section:

Section of lignite bed in the Knudsen mine.

Laboratory No.....	12454
Roof, shale.....	<i>Ft. in.</i>
Lignite.....	2 7
Shale, brown.....	a 0 4
Lignite, bony.....	a 0 7
Floor, clay.....	
Thickness of bed.....	3 6
Thickness of lignite sampled.....	2 7

a Not included in sample.

The lignite is brown and woody. Section and sample were taken at end of second entry by D. E. Winchester on July 21, 1911.

STROOL. PHILLIPS MINE.

Sample.—Lignite; northwestern South Dakota field; analysis No. 12488 (p. 100).

Mine.—Phillips; a drift mine 5 miles south of Strool, in sec. 17, T. 17 N., R. 11 E.

Lignite bed.—The lignite is of Tertiary(?) age, Lance formation, and had a thickness of 2 feet 5 inches at the point of sampling. Both roof and floor are shale. The lignite is dark brown or black, has well-developed cleavage, and otherwise closely resembles the subbituminous coal of eastern Wyoming.

The bed was measured and sampled by D. E. Winchester on July 26, 1911. The sample was taken 150 feet from the mine mouth.

TENNESSEE.

ANDERSON COUNTY.

BRICEVILLE. CROSS MOUNTAIN NO. 1 MINE.

Sample.—Bituminous coal; Cumberland Plateau field; analyses Nos. 13237, 13238, 13264, 13265, and 13290 (p. 101).

Mine.—Cross Mountain No. 1, a drift mine one-half mile west of Briceville on a branch of the Southern Railroad.

Coal bed.—Known as the Coal Creek, but not correlated with other beds in eastern Tennessee. The coal is of Carboniferous (Pottsville) age, and the average thickness is 3 feet 10 inches, the range being from 3 feet to 4 feet 6 inches. It is rather hard coal and has a well-defined cleat. The roof is a hard sandy gray shale, called "slate" by the miners. Over the first 3,000 feet of entry this roof is poor, but after that it is very strong. The floor is an underclay which is usually rather hard but softens and swells when wet and when pillars are being pulled.

The coal bed was measured and sampled at three points in the mine during January, 1912, by J. J. Rutledge and E. B. Sutton, as described below:

Sections of coal bed in Cross Mountain No. 1 mine.

Section.....	A	B	C
Laboratory No.....	13237	13238	13290
Roof, gray shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 7	.. ..	.. ..
Cannel coal.....	^a 0 1	.. ..	.. ..
Coal.....	3 0	3 10	4 0
Floor, underclay.....			
Thickness of bed.....	3 8	3 10	4 0
Thickness of coal sampled.....	3 7	3 10	4 0

^a Not included in sample.

Section A (sample 13237) was cut from the right rib of left entry 26, outby last break-through to the right.

Section B (sample 13238) was cut from a chain pillar on right entry 27, 18 feet outby the twelfth and last break-through.

Section C (sample 13290) was cut from the right rib of right entry 27, about 30 feet from main entry.

Sample 13264 was taken in room 3, off left entry 26.

Sample 13265 was taken in room 2, off left entry 26.

Notes.—In 1912 the Cross Mountain No. 1 mine was opened by a drift and worked by the room-and-pillar method. The coal was undercut by electric chain machines in the lower part of the bed. Very little explosive was used, as the coal frequently dropped while the head of the undercutting machine was being removed. When powder was necessary FFF black blasting powder was used exclusively, 40 per cent strength dynamite being used for brushing the roof. The coal was marketable either as steam or domestic coal, the latter quality being said to give the mine a decided advantage in the markets. The screens used were varied to suit the market.

BLEDSOE COUNTY.^a

HERBERT. PROSPECT.

Sample.—Bituminous coal, Cumberland Plateau field; analysis No. 10915 (p. 101).

Mine.—Prospect on State land near Herbert post office, about 4 miles north of Saratoga Springs and about 14 miles northwest of Pikeville.

^a For a description of the coals here listed see Bull. 9, Tennessee Geol. Survey.

Coal bed.—The coal is provisionally correlated with the Sewanee coal. Carboniferous system, Pennsylvanian series, Pottsville group, Walden sandstone formation. Roof, shale.

The bed was measured and sampled by H. G. Hart, under the direction of W. G. Phalen, on September 10, 1910. The sample represented a 6-foot 4-inch cut of coal. In another place the coal was 6 feet 4 inches thick, with a shale roof and clay floor. The base of the coal was not reached, but the thickness reported is 7 feet 4 inches.

The sample was taken near the mouth of the drift.

The relations of this coal bed are indicated by Phalen^a. These descriptions include a consideration of the geologic position of the coal, together with notes on its physical and chemical character.

HERBERT. PROSPECT.

Sample.—Bituminous coal, Cumberland Plateau field; analysis No. 10916 (p. 101).

Mine.—Prospect on State land near Herbert post office, about 4 miles directly north of Saratoga Springs and 14 miles northwest of Pikeville, the county seat of Bledsoe County.

Coal bed.—The coal is provisionally correlated with the Sewanee coal, Carboniferous system, Pennsylvanian series, Pottsville group, Walden sandstone formation. Roof, shale; floor, clay.

The bed was measured and sampled on September 16, 1910, by H. G. Hart, under the direction of W. C. Phalen. The sample represented a 3-foot cut of coal. It was collected at the face of a new opening which had been driven about 10 feet.

Notes.—The prospect was not being worked at the time of collection.

LITTON. A. L. HALE MINE.

Sample.—Bituminous coal; Cumberland Plateau field; analysis No. 12584 (p. 101).

Mine.—A. L. Hale, a local mine 2 miles northwest of Litton, 15 miles northeast of Nashville, Chattanooga & St. Louis Railroad at Pikeville.

Coal bed.—Angel, Carboniferous age, Pottsville formation. Dip 20° southwest. Roof, sandstone; floor, clay.

The bed was measured and sampled by W. A. Nelson on August 31, 1911. The sample represented an 8-foot cut of coal.

LITTON. PROSPECT.

Sample.—Bituminous coal; Cumberland Plateau field; analysis No. 10803 (p. 101).

Mine.—Prospect at the head of Sequatchie Valley, 4 miles north of Litton and 12 miles northeast of Pikeville, the terminus of the Sequatchie Valley branch of the Nashville, Chattanooga & St. Louis Railroad.

Coal bed.—The position of the coal is 36 feet below the base of the Sewanee sandstone, Carboniferous system, Pennsylvanian series, Pottsville group, Lookout sandstone formation.

The bed was measured and sampled August 20, 1910, under the direction of W. C. Phalen. Eight feet of coal was measured.

The sample was collected 60 feet from the drift mouth in the main and only entry.

PIKEVILLE. J. W. McFARLAND PROSPECT.

Sample.—Bituminous coal; Cumberland Plateau field; analysis No. 10731 (p. 101).

Mine.—J. W. McFarland prospect, 4 miles west of Pikeville, on the Cumberland Plateau.

^a Phalen, W. C., Preliminary Report of the Coal Resources of the Pikeville Special Quadrangle of Eastern Tennessee: Tenn. Geol. Survey Bull. 9, 1911, pp. 65-67.

Coal bed.—Morgan Springs. Carboniferous system, Pennsylvanian series, Pottsville group, Walden sandstone formation. Roof, soft blue clay, 18 inches thick.

The bed was measured and sampled August 3, 1910, under the direction of W. C. Phalen, in a country bank approximately 50 feet from the drift mouth. The sample represented a 21½-inch cut of coal.

Note.—This is the highest important coal in the Cumberland Plateau in this region.

PIKEVILLE. VAUGHN BROS. PROSPECT.

Sample.—Bituminous coal; Cumberland Plateau field; analysis No. 11049 (p. 101).

Mine.—Outcrop, about 10 miles west of Pikeville, on Cane Creek, above the junction of Cane and Meadow Creeks.

Coal bed.—The coal bed is provisionally correlated with the Sewanee coal. Carboniferous system, Pennsylvanian series, Pottsville group, Walden sandstone formation. Roof, shale; floor, clay.

The bed was measured and sampled by W. C. Phalen on October 10, 1910. The sample represented a 3-foot 9-inch cut of coal.

PIKEVILLE. VAUGHN BROS. PROSPECT.

Sample.—Bituminous coal; Cumberland Plateau field; analysis No. 11050 (p. 101).

Mine.—From an outcrop on Cane Creek, above the junction of Meadow and Cane Creeks. The outcrop is located about 10 miles west of Pikeville, the county seat of Bledsoe County.

Coal bed.—The coal bed is provisionally correlated with the Sewanee coal. Carboniferous system, Pennsylvanian series, Pottsville group, Walden sandstone formation.

The bed was measured and sampled by W. C. Phalen on October 10, 1910. The sample represented a 3-foot 2-inch cut of coal.

CUMBERLAND COUNTY.^a

LITTON. J. H. HALE & SON PROSPECT.

Sample.—Bituminous coal; Cumberland Plateau field; analysis No. 10800 (p. 101).

Mine.—J. H. Hale & Son prospect. Head of Sequatchie Valley, 4 miles from Litton post office and 12 miles northeast of Pikeville, the terminus of the Nashville, Chattanooga & St. Louis Railroad.

Coal bed.—Sewanee (?) coal. Occurring in the shale and sandstone interval above the Sewanee sandstone. Carboniferous age, Pennsylvanian series, Pottsville group, Walden sandstone formation. Roof, shale.

The bed was measured and sampled by H. G. Hart, under the direction of W. C. Phalen, on August 20, 1910.

The sample was collected 30 feet from the mouth of the prospect and represented a 5-foot 6-inch cut of coal, which was underlain by 1 foot of bone.

LITTON. J. H. HALE & SON PROSPECT.

Sample.—Bituminous coal; Cumberland Plateau field; analysis No. 10802 (p. 101).

Mine.—J. H. Hale & Son prospect, head of Sequatchie Valley, 4 miles north of Litton and 12 miles northeast of Pikeville, the terminus of the Sequatchie Valley branch of the Nashville, Chattanooga & St. Louis Railroad.

Coal bed.—Morgan Springs. The highest important coal in this part of the Cumberland Plateau. Carboniferous age, Pennsylvanian series, Pottsville group, Walden sandstone formation. Roof, shale; floor, clay, underlain with sandstone.

The bed was measured and sampled August 20, 1910, under the direction of W. C. Phalen. The sample represented a 3-foot 6-inch cut of coal.

^a For fuller descriptions of the coals here listed, see Bull. 9, Tennessee Geol. Survey, 1911.

RHEA COUNTY.^a

DAYTON. NORTH POLE MINE.

Sample.—Bituminous coal; Cumberland Plateau field; analyses Nos. 10689, 10690, 10691, 10692, and 10693 (p. 102).

Mine.—North Pole, at Dayton.

Coal bed.—Richland. Carboniferous system, Pennsylvanian series, Pottsville group, Walden sandstone formation. The bed lies above the Sewanee sandstone (the lower conglomerate member). In some places the coal bed rests directly on it, though in other places a few feet of shale or clay intervene. Locally a few feet of bony coal or "rash" occur between the main coal and the conglomerate. Roof, shale; floor, bone or clay.

The bed was measured and sampled at five points by W. C. Phalen on July 30, 1910. Sample 10689 was taken 3,000 feet from the mine mouth and represented a 25½-inch cut of coal. The lower 7 or 8 inches of coal are very soft; the rest is hard.

Sample 10690 was collected at the face of a room in left heading 5, about 2,600 feet from mine mouth, and represented a 23-inch cut of coal. Roof, shale; floor, clay.

Sample 10691 represents the bony coal or "rash" underneath the good coal in the room where sample 10640 was taken.

Sample 10692 was collected at the face of left heading 8, about 3,000 feet from the mouth of the mine and represented a 22-inch cut of coal, with bony or clay streaks. Roof, massive shale; floor, clay.

Sample 10693 was collected from the face of right heading 7, between 2,700 and 2,800 feet from the mine mouth, and represented a 24-inch cut of coal. Roof, shale; floor, clay.

Notes.—The so-called rash is a bony coal, and the sample was collected to prove this point and also to determine whether a use might be discovered for it. It is discarded in mining. It occurs locally between the coal and the top of the underlying conglomerate.

The coal is coked and the coke is used by the Dayton Coal & Iron Co. in the company's furnace at Dayton, on the Cincinnati, New Orleans & Texas Pacific Railroad.

DAYTON. NEW PROSPECT MINE.

Sample.—Bituminous coal; Cumberland Plateau field; analyses Nos. 10696, 10697, 10698, and 10699 (p. 102).

Mine.—New Prospect, at Dayton.

Coal bed.—Nelson. Carboniferous system, Pennsylvanian series, Pottsville group, Lookout sandstone formation.

The bed was measured and sampled by W. C. Phalen on July 29, 1910.

Sample 10696 was taken at the face of a room in left heading 3, about 1,200 feet from the mine mouth. The bed measured 3 feet 10½ inches. There was a 2½ layer of bone 8 inches from the top of the bed. The sample represents the lower 3 feet. Roof, sandstone; floor, bone, sometimes compact, underlain with clay and sandstone.

Sample 10697 was taken at the face of a room off left heading 2 and represented 2 feet 3 inches of coal. The lower 3 inches was laminated and soft coal. Roof, hard, sandy clay; floor, bone.

Sample 10698 was taken at the end of the right heading 2 and represented a 3-foot 2-inch cut of coal. Roof, dense, compact clay with stringers of coal varying in thickness from a knife's edge to 4 inches; floor, clay.

Sample 10699 was taken in the main heading, 1,500 to 1,600 feet from the mine mouth, and represented a 2-foot 5-inch to 2-foot 7-inch cut of coal, overlain by shale, coal, and clay. Floor, clay.

^a For a fuller account of the coals here listed see Bull. 9, Tennessee Geol. Survey, 1911.

Notes.—This is the principal coal bed of the Lookout formation, and one of the most important in the southeastern part of the Pikeville Special quadrangle. The coal is coked and the coke is used by the Dayton Coal & Iron Co. in its furnace at Dayton.

The daily output of the mine at the time of sampling was 150 tons.

UTAH.

CARBON COUNTY.

HIAWATHA. HIAWATHA No. 1 AND No. 2 MINES.

Sample.—Bituminous coal; Book Cliffs field; analyses Nos. 10904, 10905, 10907, and 10908 (p. 103).

Mine.—Hiawatha No. 1 and No. 2; drift mines at Hiawatha; railroad connections via Utah Southern Railway to Rio Grande & Western Railway at Price, 23 miles distant.

Coal bed.—Hiawatha. Cretaceous age, Mesaverde formation. Thickness, 15 feet. Dip, 1° southeast in No. 1 mine and 1° southwest in No. 2 mine. Roof, "draw slate" 18 inches thick, with sandstone cap above; floor, smooth, hard sandstone. The cover at points where samples were taken is 150 to 300 feet.

The bed was measured and sampled at four points in the mine by H. M. Wolfin, on September 9, 1910, as described below:

Sections of coal bed in Hiawatha No. 1 and No. 2 mines.

Section.....	A		B		C		D	
Laboratory No.....	10904		10905		10907		10908	
Roof, shale.....	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Top coal.....	..	..	..	..	a 2	6	..	..
Coal, bony.....	..	..	..	..	a 0	5½	a 0	7½
Coal, clean.....	3	11	5	2	4	3	4	3
Coal, bony.....	0	1	0	1	0	½	a 0	4
Coal, clean.....	..	..	..	..	..	..	1	1
Coal, bony.....	..	..	..	..	..	..	0	½
Coal, clean.....	7	2	6	2	6	0	3	4½
Coal, bony.....	..	..	..	..	..	..	0	½
Coal, clean.....	..	..	..	..	..	..	..	10
Floor, sandstone.....	..	..	..	..	..	..	..	..
Thickness of bed.....	11	2	11	5	13	3	11	7
Thickness of coal sampled.....	11	2	11	5	10	3½	10	7½

a Not included in sample.

Section A (sample 10904) was measured at the face of room 7 off left entry 1, at a depth of 300 feet below the surface at No. 1 mine.

Section B (sample 10905) was measured at the face of left aircourse 2 at No. 1 mine.

Section C (sample 10907) was measured at the face of room 2 off dip entry 2 at No. 2 mine.

Section D (sample 10908) was measured at the face of room 1 off rise entry 2 at a depth of 150 feet below the surface at No. 2 mine.

Notes.—At the time of sampling the screening plant was equipped for producing ½, ¾, 1¼, and 3-inch coal. No hand picking. There were 4 loading tracks with a capacity for 60 cars.

The mine was worked by the room-and-pillar system; in the rooms the coal was undercut and shot down with permissible explosives; some black powder was also used; in the entries the coal was shot from the solid; daily output 1,000 tons; coal acreage 3,260. A gravity incline connected the mines with the tippie 2 miles down the canyon. Mines began shipping coal in February, 1910.

PRICE. JESSE KNIGHT PROSPECT.

Sample.—Bituminous coal; Book Cliffs field; analysis No. 14678 (p. 103).

Mine.—Jesse Knight, a prospect in Right Fork of Deadman Canyon in SE. $\frac{1}{4}$ sec. 7, T. 13 S., R. 11 E., 9 miles northeast of Price, Utah, which is on the Denver & Rio Grande Railroad.

Coal bed.—No name. Cretaceous age, Mesaverde formation. This is the same bed from which sample No. 14801 was taken, and in this vicinity dips about 5° N.-NE.

The bed was measured and sampled on August 28, 1912, by F. R. Clark, as described below:

Section of coal bed in Jesse Knight prospect.

Laboratory No.....	14678
Coal.....	<i>Ft. in.</i>
Shale, sandy.....	1 2
Coal.....	a 0 3
	5 3
Thickness of bed.....	6 8
Thickness of coal sampled.....	6 5

a Not included in sample.

Notes.—The prospect was worked only during the winter season for local use. The coal is jet black, massive, with joint planes parallel to the strike of the beds. The sample was collected at a point 90 feet N. 70° W. from opening. The coal was slightly weathered.

SUNNYSIDE. No. 1 MINE.

Sample.—Bituminous coking coal; Book Cliffs field; analysis No. 12632 (p. 103).

Mine.—No. 1; in NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 32, T. 14 S., R. 14 E., at Sunnyside, which is reached by a branch of the Denver & Rio Grande Railroad.

Coal bed.—Lower. Cretaceous age, Mesaverde formation. Seven to 9 feet thick in this locality. Roof, "soapstone," said to be very weak and part of the coal is left for roof.

The bed was measured and sampled by F. R. Clark, September 14, 1911, at the face of the Fowler slope as described below:

Section of coal bed in No. 1 mine.

Laboratory No.....	12632
Coal.....	<i>Ft. in.</i>
Shale, soapstone.....	1 6
Coal.....	1 6
	7 0
Thickness of bed.....	10 0
Thickness of coal sampled (at base of bed).....	5 5

Notes.—Both beds (upper and lower veins) were being worked from this mine. The daily output at the time of sampling was about 1,600 tons. The coal was screened and loaded or sent to crushers to be crushed for the coke ovens with the coal from No. 3 mine.

SUNNYSIDE. No. 3 MINE.

Sample.—Bituminous coking coal; Book Cliffs field; analyses Nos. 12546, 12630, and 12631 (p. 103).

Mine.—No. 3; in SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 4, T. 15 S., R. 14 E., 1 mile southeast of Sunnyside, on branch of Denver & Rio Grande Railroad; connected with the railroad by the main haulage way through No. 2 mine.

Coal bed.—Cretaceous age, Mesaverde formation. Two beds are worked, the upper and lower, which, in the vicinity of the points sampled, are separated by only 6 feet of highly sandy shale forming a good roof in the one case and a good floor in the other. The lower bed is separated from a massive sandstone beneath by only a few inches of brown shale. The upper bed has a sandy shale roof containing in places a few fossil shells.

Three samples were collected from this mine (two from the upper and one from the lower bed) by F. R. Clark in 1911.

Sample 12546 was cut from the side of the outlet airway in NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 9, T. 15 S., R. 14 E. The sample includes coal from the whole upper bed (6 feet 2 inches thick). The point from which sample was taken is 50 feet north-northwest from the surface opening and the coal was weathered more or less.

Sample 12630, also from the upper bed, was cut from the face of the second crosscut off right entry 1 off No. 1 rise, which is about $1\frac{1}{4}$ miles southeast from the mouth of the mine, and was fresh and unweathered. The coal is clean, black, and massive, free from partings, and was 4 feet 8 inches thick at the point sampled.

Sample 12631 from the lower bed was taken from "the dips," or entries down the dip from the main haulage way, in the mine. The bed was about 8 feet thick at this point ($1\frac{1}{2}$ miles southeast from mouth of the mine), but only 6 feet 10 inches of the upper part of the bed was included in the sample.

Notes.—At the time of sampling the coal was undercut with hand picks and broken down with powder, and the output was about 900 tons daily. The greater part of the output was coked. No attempt was made to keep the coal from the two beds separate as they were so nearly alike in their tendencies to coke, as well as other physical and chemical characteristics. The coal from each bed was screened and loaded into cars or sent to the crusher to be crushed for the coke ovens.

SUNNYSIDE. PROSPECT.

Sample.—Bituminous coking coal; Books Cliffs field; analysis No. 12545 (p. 103).

Mine.—Prospect in NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 5, T. 15 S., R. 14 E., three-fourths of a mile south of Sunnyside, Sunnyside district, on Sunnyside branch of the Denver & Rio Grande Railroad.

Coal bed.—Lower. Cretaceous age, Mesaverde formation. Dip, 7° N., 80° E. The bed was measured and sampled on July 30, 1911, by F. R. Clark, as shown below:

Section of coal bed in prospect three-fourths of a mile south of Sunnyside.

Laboratory No.	12545
	<i>Ft. in.</i>
Coal.....	a 2 8
Shale, sandy.....	a 2 2
Coal.....	a 3 0
Coal.....	6 0
Thickness of bed.....	13 10
Thickness of coal sampled.....	6 0

a Not included in sample.

The coal was more or less weathered.

The sample was taken at a point 85 feet N. 40° E. from mouth of slope.

SUNNYSIDE. PROSPECT.

Sample.—Bituminous coal; Book Cliffs field; analysis No. 12792 (p. 103).

Mine.—Prospect in the right fork of Rock Canyon in NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 32, T. 13 S., R. 13 E., or $8\frac{1}{2}$ miles northwest of Sunnyside.

Coal bed.—No name. Cretaceous age; Mesaverde formation. This coal appears first only about 3 miles southeast of the prospect. It is a lower coal than either of those mined at Sunnyside.

The bed was measured and sampled on October 25, 1911, by F. R. Clark. The coal was at this point 5 feet 7 inches thick, and a cut across the bed was included in the sample.

Notes.—The coal is black, massive, bright, and comparatively hard. The sample was somewhat weathered, as the cut was made only 200 feet N. 72° W. from the mine opening, and the face had been exposed to the atmosphere for a long time.

SUNNYSIDE. PROSPECT.

Sample.—Bituminous coal; Book Cliffs field; analysis No. 14801 (p. 103).

Mine.—Prospect in the SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 23, T. 13 S., R. 12 E., 14 miles northeast of Wellington, Utah, and 12 miles northwest of Sunnyside, Utah.

Coal bed.—Not named. Cretaceous age, Mesaverde formation. Dip about 5° N.-NW.

The bed was measured and sampled on September 29, 1912, by F. R. Clark, as shown below:

Section of coal bed in prospect 12 miles northwest of Sunnyside.

Laboratory No.	14801
	<i>Ft. in.</i>
Bone	a 0 2
Shale, sandy	a 0 1½
Coal	2 5
Bone	0 1½
Coal	5 8
Thickness of bed	8 6
Thickness of coal sampled	8 2½

a Not included in sample.

The sample was taken at a point 100 feet S. 40° E. from opening.

Notes.—The coal is black, hard, and massive, and aside from the bone parting is free from impurities. This is the lowest bed in the series at this point that has any considerable thickness.

The coal from the prospect was mined for local use during the winter season, but there was no railroad connection.

EMERY COUNTY.

EMERY. BROWNING MINE.

Sample.—Bituminous coal; Emery field; analysis No. 12627 (p. 104).

Mine.—Browning; in the NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 33, T. 22 S., R. 6 E., about 4 miles south of Emery.

Coal bed.—I. Cretaceous age, Ferron sandstone member of the Mancos formation. The bed at this place is 22 feet thick, which is the greatest thickness known in any coal bed in this field. Roof, brown shale; floor, brown shale.

The bed was measured and sampled by C. T. Lupton on September 19, 1911, as described below:

Section of coal bed in Browning mine.

Laboratory No.	12627
	<i>Ft. in.</i>
Roof, brown shale	a 1 0
Coal	a 1 0
Shale, brown	b 20 0
Coal with one or two 1-inch brown shale partings	
Floor, brown shale	22 0
Thickness of bed	12 0
Thickness of coal sampled	

a Not included in sample.

b Upper 8 feet not included in sample.

The sample was taken at the back end of the main entry 165 feet N. 85° E. from the pit mouth.

EMERY. CASPER MINE.

Sample.—Bituminous coal; Emery field; analysis 12652 (p. 104).

Mine.—Casper; in the SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 26, T. 22 S., R. 6 E., about 4 miles southeast of Emery, in the Emery district.

Coal bed.—C. Cretaceous age, Ferron sandstone member of the Mancos formation. The bed averages about 9 feet thick in the immediate locality. Roof, sandstone; floor, soft drab clay.

The bed was measured by C. T. Lupton on September 23, 1911, as described below:

Section of coal bed in Casper mine.

Laboratory No.	12652
Roof, sandstone.	<i>Ft. in.</i>
Coal.	<i>a</i> 1 3
Sandstone and shale.	<i>a</i> 1 3½
Coal, very bony.	<i>a</i> 0 2
Coal, good.	1 6
Coal, bony.	1 1½
Coal.	4 6
Floor, soft drab shale.	
Thickness of bed.	9 10
Thickness of coal sampled.	7 3½

a Not included in sample.

The sample was taken at the back end of the main entry about 200 feet northwest from the pit mouth.

EMERY. SURFACE PROSPECT.

Sample.—Bituminous coal; Emery field; analysis No. 14903 (p. 104).

Surface prospect.—Cave under rock ledge, in the SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 32, T. 23 S., R. 6 E., about 12 miles southwest of Emery, in the Emery district.

Coal bed.—I. Cretaceous age, Ferron sandstone member of the Mancos formation. The bed is about 12 feet thick at this locality. Roof, drab and brown clay; floor, brown sandstone.

The bed was measured and sampled by C. T. Lupton on September 27, 1912, as described below:

Section of coal bed at surface prospect about 12 miles southwest of Emery.

Laboratory No.	14903
Roof, drab and brown clay.	<i>Ft. in.</i>
Coal.	5 5
Clay, brown.	<i>a</i> 1 10
Coal.	5 0
Floor, brown sandstone.	
Thickness of bed.	12 3
Thickness of coal sampled.	10 5

a Not included in sample.

The sample was taken from a surface prospect in a cave under a rock ledge at the place indicated above.

EMERY. WILLIAMS MINE.

Sample.—Bituminous coal; Emery field; analysis No. 12613 (p. 104).

Mine.—Williams; SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 12, T. 22 S., R. 6 E.; about 2½ miles east of Emery.

Coal bed.—I. Cretaceous age, Ferron sandstone member of the Mancos formation. The bed averages about 6 feet thick in this part of the field. Roof, sandstone with a little coal in the lower part; floor, sandy shale. This coal bed is about 250 feet stratigraphically above the base of the Ferron sandstone member.

The bed was sampled and measured by C. T. Lupton on September 14, 1911, as described below:

Section of coal bed in Williams mine.

Laboratory No.	12613
Roof, sandstone.	<i>Ft. in.</i>
Coal.	0 4½
Bone and coal.	0 2
Coal.	5 3
Floor, sandy shale.	
Thickness of bed.	5 9½
Thickness of coal sampled.	5 9½

The sample was taken at the back end of the main entry 200 feet S. 60° E. from the entry mouth.

SEVIER COUNTY.

EMERY. SURFACE PROSPECT.

Sample.—Bituminous coal; Emery field; analysis 15061 (p. 104).

Location.—Surface prospect; in the SW. ¼ NW. ¼ sec. 25, T. 24 S., R. 5 E., about 15 miles south of Emery.

Coal bed.—A. Cretaceous age, Ferron sandstone member of the Mancos formation. The bed averages 11 feet thick at this locality. Roof, sandstone; floor, brown shale.

The bed was measured by C. T. Lupton on November 2, 1912, as described below:

Section of coal at surface prospect, about 15 miles south of Emery.

Laboratory No.	15061
Roof, sandstone.	<i>Ft. in.</i>
Coal, bony.	0 10
Coal, bright.	1 7
Coal, dull.	5 10
Bone.	a 0 3
Coal, bright.	1 8
Coal, dull.	1 1
Floor, brown shale.	
Thickness of bed.	11 3
Thickness of coal sampled.	11 0

a Not included in sample.

Sample 15061 was taken at a surface prospect at the locality stated.

FREMONT. HOGAN PROSPECT.

Sample.—Bituminous coal; Emery field; analysis No. 15090 (p. 104).

Prospect.—Hogan; about 15 miles northeast from Fremont, in the SW. ¼ NW. ¼ sec. 3, T. 26 S., R. 4 E.

Coal bed.—A. Cretaceous age, Ferron sandstone member of the Mancos formation. The bed at this place averages 5 feet thick. Roof, shale; floor, shale and bone.

The bed was measured and sampled by C. T. Lupton on October 21, 1912, as described below:

Section of coal bed in Hogan prospect.

Laboratory No.	15090
Roof, shale.	<i>Ft. in.</i>
Coal.	a 0 8
Bone.	a 0 5
Bone and bony coal.	a 1 0
Coal.	3 0
Floor, shale and bone.	
Thickness of bed.	5 1
Thickness of coal sampled.	3 0

a Not included in sample.

The sample was taken at the back end of the drift, 20 feet N. 40° W. from the mouth.

SALINA. KEARNS & DUGGINS MINE.

Sample.—Bituminous coal; Wasatch Plateau field; analysis No. 15045 (p. 104).

Mine.—Kearns and Duggins; about 15 miles east of Salina, in the SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 7, T. 22 S., R. 3 E., Salt Lake Meridian.

Coal bed.—"Duggins." Cretaceous age, Mesaverde formation. The bed averages 3 feet 9 inches thick at this locality. Roof, shale; floor, hard gray sandstone.

The bed was measured and sampled by C. T. Lupton on October 26, 1912, as described below:

Section of coal bed in Kearns & Duggins mine.

Laboratory No	15045
Roof, shale	<i>Ft. in.</i>
Coal, containing resin globules	2 8
Bone	0 2
Coal	0 11
Floor, gray sandstone	
Thickness of bed	3 9
Thickness of coal sampled	3 7

a Not included in sample.

The sample was taken in a room off the entry, 178 feet north of the entry mouth.

SUMMIT COUNTY.

COALVILLE. REES-GRASS CREEK MINE.

Sample.—Subbituminous coal; Coalville field; analysis No. 13216 (p. 329).

Mine.—Rees-Grass Creek, a slope mine in SW. $\frac{1}{4}$ sec. 24, T. 3 N., R. 5 E., 5 miles northeast of Coalville.

Coal bed.—Wasatch. Cretaceous age, Frontier formation. The roof of the bed in some parts of the mine is sandstone and in others shale. The floor is shale.

The bed was measured and sampled by C. H. Wegemann on October 11, 1911.

The sample was taken 400 feet below the surface and 500 feet east of the main slope, and represented an 8-foot 6 $\frac{1}{2}$ -inch cut of coal.

Notes.—A slope is run on the dip of the bed about 30° northwest and the coal cars were brought to the surface by a hoisting engine. Capacity of mine, 150 to 200 tons.

COALVILLE. SUPERIOR MINE.

Sample.—Subbituminous coal; Coalville field; analysis No. 13217 (p. 329).

Mine.—Superior, a slope mine on the south side of sec. 16, T. 2 N., R. 5 E., 1 mile southeast of Coalville.

Coal bed.—Wasatch. Cretaceous age, Frontier formation. Dip of bed 10° to 15° to the south.

The bed was measured and sampled by C. H. Wegemann on October 11, 1911, and represented a 7-foot 6-inch cut of coal.

The sample was taken 200 feet below the surface, 1,000 feet northwest of the foot of slope.

Note.—Capacity of mine, 150 tons.

COALVILLE. WASATCH MINE.

Sample.—Subbituminous coal; Weber River field; analysis No. 13218 (p. 329).

Mine.—Wasatch, a slope mine in the SW. $\frac{1}{4}$ sec. 3, T. 2 N., R. 5 E., 3 miles northeast of Coalville.

Coal bed.—Wasatch. Cretaceous age, Frontier formation. Dip about 33° northwest, decreasing to 12° farther down the slope.

The bed was measured and sampled by C. H. Wegemann on October 11, 1911.

The sample was taken on the 800-foot level, 3,000 feet northeast of main slope, and represented a 10 foot 6-inch cut of coal.

Note.—The capacity of this mine at the time of sampling was about 500 tons.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 812-813.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 285.

UINTA COUNTY.

VERNAL. BLUE BELL MINE.

Sample.—Bituminous coal; Vernal field; analysis No. 10712 (p. 105).

Mine.—Blue Bell, a mine in sec. 8, T. 3 S., R. 22 E., about 7 miles north of Vernal and 100 miles east of Heber, which is the nearest station on the Rio Grande & Western Railway.

Coal bed.—No name. Cretaceous age, Mesaverde formation. Thickness, 7 feet 8 inches. Floor, brown carbonaceous shale.

The bed was measured and sampled by C. T. Lupton on August 3, 1910, as described below:

Section of coal bed in Blue Bell mine.

Laboratory No.	10712
Roof, not stated.	<i>Ft. in.</i>
Coal, bright and solid.	1 4
Coal, bony.	a 0 2½
Coal, bright and solid.	0 4½
Clay, brown, very hard.	a 0 1
Clay, very soft.	a 0 8
Coal, bright.	0 9½
Coal, dull.	0 2
Coal, bright and solid.	1 9
Shale, brown.	a 0 3½
Coal, bright.	2 0
Floor, shale.	
Thickness of bed.	7 8½
Thickness of coal sampled.	6 5½

a Not included in sample.

The above sample was taken at the face of the entry about 225 feet from the mouth.

VERNAL. GREEN MINE.

Sample.—Bituminous coal; Vernal field; analysis No. 10713 (p. 105).

Mine.—Green, a mine in sec. 13, T. 4 S., R. 22 E., 8 miles east of Vernal and about 110 miles east of Heber, which is the nearest station on the Rio Grande & Western Railway.

Coal bed.—No name. Cretaceous age, Mesaverde formation. Thickness, 4 feet 8½ inches. Roof, gray sandstone, about 2 feet thick; floor, gray sandstone about 8 feet thick.

The bed was measured and sampled by C. T. Lupton on August 2, 1910, as described below:

Section of coal bed in Green mine.

Laboratory No.	10713
Roof, sandstone.	<i>Ft. in.</i>
Coal, fair.	0 5
Coal, soft, bony.	a 0 5
Coal, hard, bony.	a 0 4
Bone, streaked with coal.	a 0 5½
Coal, good quality.	0 9½
Coal, bony.	0 ½
Coal, good.	0 7½
Shale and bone with thin coal streaks.	a 0 4½
Coal, fair quality.	0 7½
Coal, bony.	a 0 3
Coal, sandy (considered as waste).	a 0 7
Floor, gray sandstone.	
Thickness of bed.	4 11
Thickness of coal sampled.	2 6

a Not included in sample.

The sample was taken at the face of the entry, 75 feet from the mouth. The coal at this point was slightly weathered.

VERNAL. REYNOLDS MINE.

Sample.—Bituminous coal; Vernal field; analysis No. 10812 (p. 105).

Mine.—Reynolds, a mine in sec. 20, T. 3 S., R. 19 E., about 20 miles west of Vernal and 80 miles east of Heber, which is the nearest station on the Rio Grande & Western Railway.

Coal bed.—Mancos. Cretaceous age, Mesaverde formation. Thickness, 5 feet 4 inches; dip, 20° south. Roof, shale, about 4 feet thick; floor, shale. Dip, 20° to the south.

The bed was measured and sampled by C. T. Lupton on August 18, 1910, as described below:

Section of coal bed in Reynolds mine.

Laboratory No.	10812
Roof, shale.	<i>Ft. in.</i>
Clay shale with streaks of coal near bottom.	a 0 7½
Coal, bright.	a 0 2
Clay shale, brown and soft.	a 0 2½
Coal, solid.	2 1½
Clay shale, brown with coal streaks.	a 0 2
Coal, solid.	0 6
Coal, bony.	a 0 4
Coal, solid and bright.	1 2½
Floor, brown clay.	
Thickness of bed.	5 4
Thickness of coal sampled.	3 10

a Not included in sample.

The sample was taken at the face of the main entry about 210 feet from the surface.

WASATCH COUNTY.

HANNA. PROSPECT.

Sample.—Subbituminous coal; Blacktail Mountain field; analysis No. 10998 (p. 105).

Mine.—This prospect, in sec. 26, T. 1 S., R. 9 W., on Red Creek, is about 15 miles southwest of Hanna post office and 30 miles east of Heber, which is the nearest station on the Rio Grande & Western Railway.

Coal bed.—Cretaceous age, Mesaverde formation. Thickness, about 24 feet. Roof, a brown shale, which contains a small amount of bone and coal; floor, a brown clayey shale.

The bed was measured and sampled by C. T. Lupton on September 13, 1910, as described below:

Section of coal bed in prospect 15 miles southwest of Hanna.

Laboratory No.	10998
Roof, shale.	<i>Ft. in.</i>
Coal, bright and hard.	18 6
Shale, brown.	a 0 1½
Coal, bright and hard.	4 5
Coal, dull and slightly dirty.	1 9
Floor, clay shale.	
Thickness of bed.	24 9½
Thickness of coal sampled.	24 8

a Not included in sample.

The above sample was taken at the face of the entry about 100 feet from the mine mouth.

HANNA. WINCHESTER PROSPECT.

Sample.—Lignite; Blacktail Mountain field; analysis No. 10997 (p. 105).

Mine.—Winchester, a prospect in sec. 7, T. 1 S., R. 7 W., on Farm Creek about 3 miles east of Hanna post office and 40 miles east of Heber, which is the nearest station on the Rio Grande & Western Railway.

Coal bed.—Mancos. Cretaceous age, Mesaverde formation. Thickness, about 5 feet.

The bed was examined and sampled by C. T. Lupton on September 9, 1910, as described below:

Section of coal bed in Winchester prospect.

Laboratory No.	10997
Roof, gray sandstone.	<i>Ft.</i> <i>in.</i>
Coal, containing lenses of sandstone.	<i>a</i> 0 1
Coal, good and bright.	4 10
Floor, carbonaceous shale.	
Thickness of bed.	4 11
Thickness of coal sampled.	4 10

a Not included in sample.

The above sample was taken about 10 feet down the slope from the entry mouth.

HEBER. CUMMINGS MINE.

Sample.—Subbituminous coal; Blacktail Mountain field; analysis No. 11058 (p. 105).

Mine.—Cummings; an abandoned mine in sec. 31, T. 1 S., R. 10 E., on Current Creek, about 28 miles southeast of Heber, which is the nearest station on the Rio Grande & Western Railway.

Coal bed.—Not named. Cretaceous age, Mesaverde formation. Thickness, about 13 feet.

The sample was taken by C. T. Lupton in September, 1910, and represented a 10-foot 6-inch cut of coal. The mine was more or less caved and the sample was taken from a good surface exposure.

VIRGINIA.

DICKENSON COUNTY.

CLINTWOOD. ELBERT POWERS MINE.

Sample.—Bituminous coal; central Appalachian field; analysis No. 14767 (p. 105).

Mine.—Elbert Powers, a local mine, 3 miles southeast of Clintwood.

Coal bed.—Supposed to be Clintwood. Carboniferous age, Pottsville formation. Roof, bone; floor, coal; cover, 25 feet.

The bed was measured and sampled by W. A. Nelson, September 17, 1912, as described below:

Section of coal bed in Elbert Powers mine.

Laboratory No.	14767
Roof, not stated.	<i>Ft.</i> <i>in.</i>
Coal.	<i>a</i> 2 7½
Bone.	<i>a</i> 0 7
Coal.	1 11
"Rash"	0 3
Coal.	0 3½
"Rash"	0 3
Coal.	2 4
Floor, coal.	
Thickness of bed.	7 10½
Thickness of coal sampled.	4 8

a Not included in sample.

The section was measured in the main entry 20 feet from the mine mouth.

CLINTWOOD. YEATES MINE.

Sample.—Bituminous coal; central Appalachian field; analysis No. 14766 (p. 105).

Mine.—Yeates, a local drift mine near Clintwood, 5 miles west of the Clinchfield, Carolina & Ohio Railroad.

Coal bed.—Clintwood. Carboniferous age, Pottsville formation. Thickness, uniform. The bed lies flat. Roof, shale; floor, shale.

The bed was measured and sampled by W. A. Nelson on September 21, 1912, as described below:

Section of coal bed in Yeates mine.

Laboratory No.	14766
Roof, shale.	<i>Ft. in.</i>
Bone.	0 1
Coal.	0 9
Bone.	0 2
Coal.	0 8½
Bone.	0 1½
Coal.	0 3½
Bone.	0 1½
Coal.	0 3
Bone.	0 1
Coal.	1 8
Floor, shale.	
Thickness of bed.	4 2¾
Thickness of coal sampled.	4 2¾

The bed was measured at the end of right entry 1, off the main entry, 100 feet from the main entry.

HENRICO COUNTY.

GAYTON. CARBON HILL MINE.

Sample.—Semibituminous coal; Richmond basin field; analyses Nos. 15050 and 15051; also natural coke analysis No. 15052 (p. 106).

Mine.—Carbon Hill, a slope mine 1 mile from Gayton and connected by private railroad line to the Chesapeake & Ohio Railroad at Lorain.

Coal beds.—B and C. Triassic age, Newark series. The bed has an approximate dip of 35° to the west. Occasional faults are encountered. The B seam contains numerous bands of shale. The floor of the B bed is an underclay; the roof of the B bed and the roof and floor of the C bed are shale. The C bed has been coked in places by the heat of igneous intrusions.

The B bed was measured and sampled at one point and the C bed at two points in the mine by H. I. Smith on November 3, 1912, as described below:

Sections of C bed in the Carbon Hill mine.

Section.	A	B
Laboratory No.	15050	15052
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Natural coke.	a 0 2	2 3
Coal.	3 4	a 1 0
Floor, carbonaceous shale.		
Thickness of bed.	3 6	3 3
Thickness of coal sampled.	3 4	2 3

a Not included in sample.

Section of B bed in the Carbon Hill mine.

Laboratory No.	15051
Roof, "draw slate."	<i>Ft. in.</i>
Coal, hard.	1 0
Shale.	a 0 1
Coal streaked with shale.	0 6
Shale.	0 ½
Coal, very friable.	1 0
Shale.	0 ½
Coal.	0 11½
Shale.	a 0 1
Coal.	1 3
Floor, clay.	
Thickness of bed.	4 11
Thickness of coal sampled.	4 9

a Not included in sample.

Section A (sample 15050) was taken in the main gangway, opposite room 45 (C bed).
 Section B (sample 15052) was taken in the main gangway, opposite room 32 (C bed).
 Sample 15051 was measured at the face of right gangway 1 off slope 3, 20 feet ahead of room 21 (B bed).

Notes.—The Carbon Hill mine is opened by a slope which strikes the coal a short distance from the surface and follows the dip of the coal. At the time of sampling the coal was undercut by hand and shot down with a permissible explosive. The coal mined was washed on account of the "slate" partings in B bed being very brittle. It is estimated that one-fourth of the coal mined was lost in washing by breaking to a very fine slack. It was claimed that the mine had been worked at intervals for 100 years, and that it had a probable life of 100 years more. The future tonnage was to be derived from both pillar and advanced workings. Pillars had not, as yet, been pulled. The daily output of the mine was 150 tons, with a maximum day's run of 345 tons. This amount was to be increased to 600 tons. Pickers were employed on both the cars and on belt. The coal loaded was fine, containing practically no lump. There were two loading tracks with a capacity of 15 loaded cars and 15 empty cars. Only the B and C beds were being worked.

For a description of the geological relations of these coal beds, see 19th Annual Rept., 1897-98, U. S. Geol. Survey, 1899, p. 474.

RUSSELL COUNTY.

DANTE. No. 2 AND No. 5 MINES.

Sample.—Bituminous coal; Russell Fork field; analyses Nos. 10734, 10735, 10737, and 10738 (p. 106).

Mine.—Nos. 2 and 5, drift mines, 2 miles north of Dante on the Carolina, Clinchfield & Ohio Railway.

Coal bed.—Upper Banner. Carboniferous age, Norton formation. Average thickness, 5 feet 2½ inches. Roof, gray shale, of good quality; floor, smooth hard shale.

The bed was measured and sampled at four points in the mine by P. M. Riefkin on August 13, 1910, as described below:

Sections of coal bed in No. 2 and No. 5 mines.

Section.....	A 10734 Ft. in.	B 10735 Ft. in.	C 10737 Ft. in.	D 10738 Ft. in.
Roof, gray shale.....				
Coal, hard.....	0 8½	0 6½	0 4½	0 8
Coal.....	0 3½	0 5	0 3½	1 2½
Mother coal.....	0 5½	0 7	1 1½	0 4½
Coal, hard.....	0 0 ¾	a 0 1½	a 0 1½	a 0 1½
Sandstone.....	1 4	1 4	0 10	0 4½
Coal.....	a 0 ¾	a 0 2¾	a 0 ¾	a 0 ¾
Shale.....	0 5	0 6	0 5½	0 6½
Coal.....	0 5	0 3½	0 3½	0 6½
Coal, hard.....	1 5½	1 1	0 7	1 6
Coal.....	.. ..	.. ..	0	.. ..
Mother coal.....	.. ..	.. ..	1	.. ..
Coal.....	.. ..	.. ..	1	.. ..
Floor, hard smooth shale.....				
Thickness of bed.....	5 2½	5 1½	5 2½	5 5½
Thickness of coal sampled.....	5 1	4 9½	5 1	5 3

a Not included in sample.

Section A (sample 10734) was measured at the face of the butt heading off the fourth left drift off the McClure entry, No. 2 mine.

Section B (sample 10735) was measured in room 16, off right heading 3, off the first drift off the McClure entry, No. 2 mine.

Section C (sample 10737) was measured at the face of room 14, right heading 5, off drift 9, No. 5 mine.

Section D (sample 10738) was measured from the butt on left heading 9, off drift 9, No. 5 mine.

Notes.—These mines are opened by drift entries and deliver the coal over the same tippie. At the time of sampling the coal was undercut by machines and shot down with black powder. A new tippie, under construction, was to be equipped to produce various commercial sizes. There was one loading track with a capacity of 40 cars. The combined daily production of the two mines was 1,600 to 1,700 tons, obtained from both advance and pillar workings. It was stated that the production of the mines would probably be increased to about 2,400 tons.

WISE COUNTY.

FLAT GAP. REUBEN BOLLING MINE.

Sample.—Bituminous coal; central Appalachian field; analysis No. 15174 (p. 107).

Mine.—Reuben Bolling. Local mine 2 miles east of Flat Gap and 10 miles from nearest railroad.

Coal bed.—Lower Bolling. Carboniferous age, Pottsville formation. Thickness, uniform, flat; roof, shale; floor, clay; cover, 25 feet.

The bed was measured and sampled by Charles Butts, November 1, 1912, as described below:

Section of coal bed in the Reuben Bolling mine.

Laboratory No.....	15174
Roof, shale.....	<i>Ft. in.</i>
Coal.....	a 0 4
Clay.....	a 0 10
Coal.....	1 5
Clay.....	0 1
Coal.....	1 5
Floor, clay.....	
Thickness of bed.....	4 1
Thickness of coal sampled.....	2 11

a Not included in sample.

The bed was measured in the entry 15 feet from mine mouth.

GLAMORGAN. GLAMORGAN NO. 3 MINE.

Sample.—Bituminous coal; central Appalachian field; analysis Nos. 15100 and 15101 (p. 107).

Mine.—Glamorgan No. 3, a drift mine at Glamorgan, on the Wise Terminal Railroad.

Coal bed.—Glamorgan. Carboniferous age, Pottsville formation. Thickness, variable, nearly flat; roof, shale; floor, shale.

The bed was measured and sampled by Charles Butts, November 5, 1912, as described below:

Sections of coal bed in Glamorgan No. 3 mine.

Section.....	A 15100	B 15101
Laboratory No.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, shale.....		
Coal.....	1 9	3 8
Bone ^a	a 0 1	a 0 1
Coal.....	1 10	0 7
Bone ^a	a 0 1½	.. ..
Coal.....	0 8	.. ..
Floor, not stated.....		
Thickness of bed.....	4 5½	4 4
Thickness of coal sampled.....	4 3	4 3

a Not included in sample.

Section A (sample 15100) was measured at the face of the second dip entry, 6,000 feet from the mine mouth.

Section B (sample 15101) was measured at the face of the Gladly entry, 7,000 feet from the mine mouth.

Note.—The coal from this mine is of good coking quality.

PARDEE. PARDEE MINE.

Sample.—Bituminous coal; central Appalachian field; analysis No. 15099 (p. 107.)

Mine.—Pardee; a drift mine at Pardee, on the Roaring Fork Railroad.

Coal bed.—Pardee (Limestone, Parsons). Carboniferous age, Pottsville formation. Thickness, uniform, flat; roof, shale; floor, shale.

The bed was measured and sampled by Charles Butts, November 6, 1912, and represented a 9-foot 7-inch cut of coal.

The section was measured at face of main entry, 2,000 feet from drift mouth.

Note.—The coal was hard.

WASHINGTON.^a

KING COUNTY.

GRAND RIDGE. GRAND RIDGE MINE.

Sample.—Subbituminous coal; analyses Nos. 11736, 11737, 11738 (p. 107).

Mine.—Grand Ridge, a slope mine one-fourth mile east of Grand Ridge and 3 miles east of Issaquah, in the SE. $\frac{1}{4}$ NE. $\frac{1}{4}$, sec. 26, T. 24 N., R. 6 E., on the North Bend branch of the Northern Pacific Railway.

Coal beds.—No. 3, No. 4, and No. 7. Tertiary (Eocene) age, Puget formation. Dip, about 32° NW.

The beds were measured and sampled on February 9, 1911, by G. W. Evans, as described below:

Sections of coal beds in the Grand Ridge mine.

Section	A	B	C
Laboratory No.	11736	11737	11738
Roof: Section A, sandstone; section B, shale; section C, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal	1 7	.. ..	1 6
Shale, carbonaceous	a0 3	a0 4	.. ..
Clay, white, plastic	a0 6	.. ..	a0 $\frac{1}{2}$
Coal	1 11	3 1	1 5
Clay, white, plastic	a0 5	.. ..	a0 $\frac{1}{2}$
Bone and coal	a1 2	.. ..	.. ..
Coal .....	.. ..	.. ..	1 7
Shale, laminated	a0 4	.. ..	.. ..
Clay, plastic .....	.. ..	.. ..	a0 5
Coal, somewhat bony .....	.. ..	.. ..	0 8
Clay, plastic .....	.. ..	.. ..	a0 5
Coal, impure .....	.. ..	.. ..	a0 6
Shale, carbonaceous .....	.. ..	.. ..	a1 1
Floor: Section A, sandstone; sections B and C, shale.			
Thickness of bed	6 2	3 5	7 7 $\frac{1}{2}$
Thickness of coal sampled	3 6	3 1	5 2

^a Not included in sample.

Section A (sample 11736) was collected from the No. 3 bed, on the left side of chute 4. The sample was dry when taken.

Section B (sample 11737) was collected from the No. 4 bed, on the north side where the rock tunnel cuts the bed. The sample was damp when taken.

Section C (sample 11738) was collected from bed No. 7. The sample was wet when taken.

Note.—The output from each of beds Nos. 3, 4, and 7 was 250 tons a day.

^a For a detailed discussion of Washington coals see U. S. Geol. Survey Bull. 474.

KITTITAS COUNTY.

ELLENSBURG. BUCHANNON PROSPECT.

Sample.—Bituminous coal; Manastash field; analysis No. 13267 (p. 107.)

Locality.—Buchannon prospect, in sec. 16, T. 18 N., R. 15 E., about 25 miles west of Ellensburg, which is on the Northern Pacific and the Chicago, Milwaukee & Puget Sound Railways.

Coal beds.—No. 10d. Tertiary (Eocene) age, Manastash formation. Thickness, 3 feet 9½ inches.

The bed was measured and sampled by E. J. Saunders on August 2, 1911, as described below:

Section of coal bed in prospect, 25 miles west of Ellensburg.

Laboratory No.....	13267
Bone and coal.....	<i>Ft. in.</i>
Shale, crushed.....	0 3
Coal and bone.....	a 0 8
Coal (lenses).....	0 5
Coal, soft, with shale.....	0 3½
Coal.....	0 5
Coal, soft, with shale.....	1 5
Coal.....	0 4
Thickness of bed.....	3 9½
Thickness of coal sampled.....	3 1½

a Not included in sample.

The sample was collected from the face of the entry, 35 feet northeast of its mouth. The sample was wet when taken.

ELLENSBURG. PROSPECT.

Sample.—Bituminous coal; Manastash field; analysis No. 13266 (p. 107).

Locality.—Prospect in sec. 22, T. 18 N., R. 15 E., about 25 miles west of Ellensburg, which is on the Northern Pacific and the Chicago, Milwaukee & Puget Sound Railways.

Coal bed.—No. 7. Tertiary (Eocene) age, Manastash formation. Roof and floor, shale. Thickness, 2 feet 10½ inches.

The bed was measured and sampled by E. J. Saunders on August 1, 1911, as described below:

Section of coal bed in prospect, 25 miles west of Ellensburg.

Laboratory No.....	13266
Roof, shale.....	<i>Ft. in.</i>
Coal, bony.....	0 8½
Coal.....	0 6
Bone.....	a 0 1
Coal.....	1 4
Coal and bone (crushed).....	0 3
Floor, shale.....	
Thickness of bed.....	2 10½
Thickness of coal sampled.....	2 9½

a Not included in sample.

The sample was collected from face of the entry, 30 feet from the mouth. It was dry when taken.

Note.—The mine was idle at the time of sampling.

ELLENSBURG. PROSPECT.

Sample.—Bituminous coal; Manastash field; analysis No. 13268 (p. 107).

Locality.—Prospect in sec. 22, T. 18 N., R. 15 E., about 25 miles west of Ellensburg, which is on the Northern Pacific and the Chicago, Milwaukee & Puget Sound Railways.

Coal beds.—No. 9c. Tertiary (Eocene) age, Manastash formation.

The bed was measured and sampled by E. J. Saunders on August 1, 1911, as described below:

Section of coal bed in prospect, 25 miles west of Ellensburg.

Laboratory No.	13268
Roof, shale.	<i>Ft. in.</i>
Shale, carbonaceous.	a 0 2
Coal, slightly bony.	0 6
Coal, soft, and shale.	1 0
Coal.	1 8
Shale, carbonaceous.	a 0 2
Floor, shale.	
Thickness of bed.	3 6
Thickness of coal sampled.	3 2

a Not included in sample.

The sample was collected from the face of the entry, 40 feet from its mouth. It was wet when taken.

ROSLYN. ROSLYN NO. 1 AND NO. 2 MINES.

Sample.—Bituminous coal; analyses Nos. 11522, 11523, 11524, 11525, and 11256 (p. 107).

Mines.—Roslyn No. 1 and No. 2, slope mines at Roslyn, in secs. 8 and 9, T. 20 N., R. 15 E., on a branch of the Northern Pacific Railway, with which line it connects at Clealum.

Coal bed.—Roslyn. Eocene age, Roslyn formation. Average thickness, 4 feet 4 inches; dip of bed in No. 1 mine, 9° W., and in No. 2, 18° W.; roof, gray shale, 10 feet thick in Mine No. 1, and 18 to 20 feet thick in mine No. 2; floor in each mine, smooth, hard clay, in places more or less shaly; cover, at points where samples were taken, 30 to 120 feet thick.

The bed was measured and sampled at four points in the mine by H. M. Wolfkin, on January 2, 1911, as described below:

Sections of coal bed in Roslyn No. 1 and No. 2 mines.

Section.	A	B	C	D
Laboratory No.	11522	11523	11524	11526
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, soft.	1 1½	1 1½	1 1½	2 6
Coal, slaty.	0 1	0 ¾	0 ¾	0 ¾
Coal, hard.	0 1½	0 1	0 1½	0 1½
Coal, soft.	0 9½	1 5	1 1½	1 1½
Coal, sulphurous.	0 1	a 0 2	0 1½	0 1½
Coal, soft.	0 6½	0 1	0 1	0 1
Coal, bony.	0 1	0 1	0 1	0 1
Coal, soft.	1 6	1 3	1 9	1 7
Floor, clay.				
Thickness of bed.	4 2½	3 11½	3 11½	4 3
Thickness of coal sampled.	4 2½	3 9½	3 11½	4 3

a Not included in sample.

Section A (sample 11522) was measured at the face of the southwest slant entry of the No. 1 mine, at a depth of 80 feet below the surface.

Section B (sample 11523) was measured at the face of east entry 1, in the No. 1 mine, 120 feet below the surface.

Section C (sample 11524) was measured at the face of west entry 2, in the No. 1 mine, 100 feet below the surface.

Section D (sample 11526) was measured at the face of the main slope of the No. 2 mine, 30 feet below the surface.

A composite sample was made by mixing samples 11522, 11523, and 11324. The results of an ultimate analysis of the sample are given under laboratory No. 11525.

Notes.—At the time of sampling none of the coal from these mines was shipped as run-of-mine. About 50 per cent of the coal passed through 2 $\frac{3}{4}$ to 3 inch bar screens. The coal was not hand picked. There were three loading tracks, with a capacity for 30 or 40 cars. Each mine had its own tippie and screening plant. Each mine was opened by a slope; double entry, room-and-pillar system of mining used; black powder used for breaking coal after undercutting. The output of the No. 1 mine was 400 tons a day. The No. 2 mine was equipped for handling about 500 tons a day. Mine No. 1 had an unmined area of 400 to 500 acres and No. 2 of about 120 acres.

THORP. WILSON MINE.

Sample.—Bituminous coal; Manastash field; analysis No. 13269 (p. 108).

Mine.—J. Wilson, in sec. 33, T. 19 N., R. 16 E., 10 miles west of Thorp, a station on the Northern Pacific Railway.

Coal bed.—No name. Tertiary (Eocene) age, Manastash formation. The bed, including shale partings, is about 9 feet thick. Roof, gray shale; floor, carbonaceous shale.

The bed was measured by E. J. Saunders on July 17, 1911.

Section of coal bed in Joseph Wilson mine.

	<i>Ft. in.</i>
Roof, gray shale.	1 2
Shale, carbonaceous, slightly graphitic.	0 3
Coal	0 9
Shale, carbonaceous, graphitic.	1 3
Coal, impure and crushed.	0 11
Shale, graphitic.	1 0
Coal	a 0 2
Shale, carbonaceous.	a 0 8
Coal	a 0 4
Shale, carbonaceous.	a 1 0
Shale	a 1 8
Floor, carbonaceous shale.	
Thickness of bed.	9 2

a Not mined.

The sample analyzed represented run-of-mine coal taken from bunkers. It was dry when collected.

LEWIS COUNTY.

MENDOTA. MENDOTA NO. 1 MINE.

Sample.—Subbituminous (cannel) coal; analyses Nos. 12305 and 14084 (p. 108).

Mine.—Mendota No. 1, a slope mine at Mendota, about 6 miles east of Centralia, on the Centralia and Eastern branch of the Northern Pacific Railway.

Coal bed.—Locally termed No. 3; Tertiary (Eocene) age, Puget formation. Dip 5 to 12 per cent. Thickness, approximately 10 feet with several partings of clay $\frac{1}{2}$ to 1 $\frac{1}{2}$ inches thick; roof, soft, moist, crumbly, massive sandstone; in most sections of the mine, between the coal and the roof there is a band of soft, moist, gray clay about 2 inches thick. The sandstone roof is about 6 to 12 feet thick and is overlain with hard gray shale. The floor consists of a fairly hard and smooth sandy clay.

The coal bed was sampled at two points in the mine by H. M. Wolfin on May 22, 1911, and May 31, 1912.

Sample 12305 represented selected coal cut from the rib on the second level. This coal had the appearance of cannel and occurs in lenses and as vertical streaks. The sample was cut from a vertical streak 1 $\frac{1}{2}$ inches wide.

Sample 14084 was cut from rib, south level, and represented a selected sample of "cannel" coal that occurs in lenses in the coal bed. These lenses are irregular in

size, shape, and occurrence and consist of coal that is soft, easily lighted by a match, burns with a smoky flame, and gives off a strong odor of coal tar.

Notes.—The Mendota No. 1 mine was opened by a slope driven across the pitch at an angle of 35° to 40° to the direction of the dip. At the time of sampling the coal was shot off the solid with FFF black blasting powder. The shaker screens were 5 feet 4 inches by 10 feet with holes 3 by 6 inches and $2\frac{1}{4}$ inches in diameter. The shaker screens for the smaller sizes of coal were 5 feet 4 inches by 10 feet with $\frac{3}{8}$ -inch holes. The revolving screen for washed coal was 14 feet long—8 feet with $\frac{1}{4}$ -inch openings and 6 feet with $\frac{7}{8}$ -inch openings. The sizes produced in washing were on $\frac{7}{8}$ -inch, on $\frac{1}{4}$ -inch and through $\frac{1}{4}$ -inch holes. Three loading tracks, with a capacity of 50 empty cars and 30 loaded cars, were available. The mine had a daily output of 300 tons with a maximum day's run of 800 tons. About 2,000 acres of coal remained to be taken out from this opening.

MORTON. PROSPECT.

Sample.—Subbituminous coal; analysis No. 12563 (p. 108).

Locality.—Prospect in the SW. $\frac{1}{4}$ sec. 12, T. 12 N., R. 4 E., 2 miles southeast of Morton, which is the southern terminus of the Tacoma Eastern Railroad.

Coal bed.—Edlund. Tertiary (Eocene) age, Manastash formation. Strike, S. 70° E.; dip 16° S., 20° W.; roof and floor, sandstone. The bed is reported to be 7 feet thick near the surface, but further in is much faulted and thins to 12 inches.

The bed was measured and sampled by A. J. Collier on August 18, 1911. The sample was taken 4 feet from the surface and represented 4 feet of coal.

Note.—At the time of sampling the prospect had been abandoned owing to faults and thinning out of the bed.

MORTON. PROSPECT.

Sample.—Subbituminous coal; analysis No. 12564 (p. 108).

Locality.—Prospect in the SW. $\frac{1}{4}$ sec. 6, T. 12 N., R. 5 E., 2 miles east of Morton, which is the southern terminus of the Tacoma Eastern Railroad.

Coal bed.—Not named. Tertiary (Eocene) age, Manastash formation. Dip at surface 22° NE., increasing with depth. Thickness reported to decrease from 6 feet to 2 feet with depth. Bed faulted at end of workings 350 feet from mouth of the tunnel.

The bed was measured and sampled by A. J. Collier on August 24, 1911, as described below:

Section of coal bed in prospect 2 miles east of Morton.

Laboratory No.	12564
Roof, sandstone.	Fl. in.
Coal.	a 0 3
Bone.	a 0 7
Coal.	2 0
Floor, sandstone.	
Thickness of bed.	2 10
Thickness of coal sampled.	2 0

a Not included in sample.

The sample was collected in the drift 20 feet from the mouth.

Note.—The prospect had been abandoned owing to faults and thickness of bed.

MORTON. PROSPECT.

Sample.—Semianthracite coal; analysis No. 12565 (p. 108).

Locality.—Prospect in sec. 14, T. 13 N., R. 4 E., 4 miles north of Morton, which is the southern terminus of the Tacoma Eastern Railroad.

Coal bed.—No name. Tertiary (Eocene) age. Thickness, 12 to 15 feet.

The bed was measured and sampled by A. J. Collier on August 16, 1911, as described below:

Section of coal bed in prospect 4 miles north of Morton.

Laboratory No.	12565
	<i>Ft. in.</i>
Coal with thin sandstone partings.	a 6+ 0
Coal and bone.	a 2
Coal.	6+ 0
Thickness of bed.	14+ 0
Thickness of coal sampled.	6+ 0

a Not included in sample.

The sample was collected in the entry, about 60 feet from the mouth of the entry.

PIERCE COUNTY.

ASHFORD. PROSPECT.

Sample.—Semibituminous coal; analysis No. 12581 (p. 108).

Locality.—Prospect in the NW. $\frac{1}{4}$ sec. 15, T. 15 N., R. 6 E., at Ashford on the Tacoma Eastern Railway.

Coal bed.—Misqually Chief. Tertiary (Eocene) age, Puget formation. Roof, altered shale; thickness, 13 feet 4 inches.

The bed was measured and sampled by G. W. Evans on August 26, 1911, as described below:

Section of coal bed in prospect at Ashford.

Laboratory No.	12581
Roof, altered shale.	<i>Ft. in.</i>
Shale, carbonaceous.	a 0 5
Coal.	0 6
Sandstone.	a 0 4
Coal.	1 2
Shale.	a 0 4
Coal.	5 3
Bone.	0 1
Coal and dirt.	1 2
Coal.	2 0
Shale.	a 0 2
Coal.	0 5
Shale.	a 0 2
Coal, shaly.	1 2
Clay, soft.	a 0 2
Floor, not stated.	
Thickness of bed.	13 4
Thickness of coal sampled.	11 9

a Not included in sample.

The sample was collected in the entry 100 feet from its mouth. It was wet when taken.

FAIRFAX. PROSPECT.

Sample.—Bituminous coal; analysis No. 12478 (p. 108).

Locality.—Prospect in the SW. $\frac{1}{4}$ sec. 2, T. 17 N., R. 6 E., 2 miles south of Fairfax, which is on a branch line of the Northern Pacific Railway.

Coal bed.—Montezuma. Tertiary (Eocene) age, Puget formation. Roof and floor, strong carbonaceous shale.

The bed was measured and sampled by G. W. Evans on July 25, 1911, as described below:

Section of coal bed in a prospect 2 miles south of Fairfax.

Laboratory No.....	12478
Roof, carbonaceous shale.....	<i>Ft. in.</i>
Shale, soft brown.....	a 0 10
Coal, soft impure.....	a 0 10
Coal, impure, varying in hardness.....	a 3 11
Coal, good.....	4 0
Floor, carbonaceous shale.....	
Thickness of bed.....	9 7
Thickness of coal sampled.....	4 0

a Not included in sample.

The sample was collected from the face of the entry, 45 feet from the mouth of the entry. It was wet when taken.

FAIRFAX. PROSPECT NO. 1.

Sample.—Bituminous coal; analysis No. 12496 (p. 109).

Locality.—Prospect No. 1 in the NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 34, T. 18 N., R. 6 E., one-half mile south of Fairfax, which is on a branch line of the Northern Pacific Railway.

Coal bed.—No. 1. Tertiary (Eocene) age, Puget formation.

The bed was measured and sampled by G. W. Evans on August 1, 1911, as described below:

Section of coal bed in Prospect No. 1.

Laboratory No.....	12496
Roof, shale.....	<i>Ft. in.</i>
Coal, impure.....	1 6
Coal.....	1 4
Shale, 8 inches thick.....	
Shale and clay, 7 inches thick.....	
Floor, sandy shale.....	
Thickness of bed.....	2 10
Thickness of coal sampled.....	2 10

The sample was collected in the entry, 35 feet from its mouth. It was wet when taken.

FAIRFAX. PROSPECT NO. 2.

Sample.—Bituminous coal; analysis No. 12495 (p. 109).

Locality.—Prospect No. 2 in the NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 34, T. 18 N., R. 6 E., one-half mile south of Fairfax, which is on a branch line of the Northern Pacific Railway.

Coal bed.—No. 2. Tertiary (Eocene) age, Puget formation.

The bed was measured and sampled by G. W. Evans on August 1, 1911, as described below:

Section of coal bed in Prospect No. 2.

Laboratory No.....	12495
Roof, shale.....	<i>Ft. in.</i>
Clay, soft dark.....	a 0 4
Coal, dirty.....	2 0
Coal.....	0 11
Coal, bony.....	a 1 2
Bone.....	1 0
Floor, sandy shale.....	
Thickness of bed.....	5 5
Thickness of coal sampled.....	3 11

a Not included in sample.

The sample collected was in the entry, 35 feet from its mouth. It was wet when taken.

WILKESON. GALE CREEK MINE.

Sample.—Bituminous coal; analyses Nos. W31921 to W31926, W32104 to W32108, 14390, W32145 to W32148, W32158 to W32161, and W32211 to W32214 (pp. 109, 110).

Mine.—Gale Creek, a drift and slope mine at Wilkeson, about 30 miles southeast of Tacoma, on a branch of the Northern Pacific Railway.

Coal bed.—Queen. Tertiary (Eocene) age, Puget group. Average thickness, 3 feet 8 inches; dip, 8° to 85° SW., with a probable average of about 30°. The cleat is indistinct and there are many faults and rolls throughout the bed. Roof, "draw slate" 5 inches thick, above which is a hard gray shale extending to a cap rock 30 to 40 feet above; floor, hard, smooth, gray clay, shaly in places.

The bed was measured and sampled at six points in the mine by H. M. Wolf in on June 18 and 25, 1912, and six other samples were taken in duplicate from 27 carloads, as described below:

Sections of coal bed in Gale Creek mine.

Section.....	A	B	C	D	E	F
Laboratory No.....	{ W31921 W31922	{ W31923 W31924	{ W31925 W31926	{ W32106	W32107	W32108
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
"Draw slate".....	.. ..	.. ..	.. ..	a 0 5	.. ..	a 0 5
Coal.....	.. ..	0 1	.. ..	.. ..	.. ..	.. ..
Bone (local).....	.. ..	0 1	.. ..	a 0 1	.. ..	.. ..
Coal.....	1 11½	2 ½	2 ½	1 8½	2 2	2 1
Clay-streaked coal (?).....	a 0 4½	a 0 4	a 0 3½	a 0 2	a 0 3½	a 0 6
Coal.....	1 4	1 2	1 5	1 4	1 2	1 8
Floor, shaly clay.....	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 8½	3 7½	3 9	3 8½	3 7½	4 8
Thickness of coal sampled.....	3 3¼	3 3¼	3 5½	3 3	3 4	3 9

a Not included in sample.

Section A (samples W31921 and W31922) was measured at the face of gangway 1, off new slope.

Section B (samples W31923 and W31924) was measured at breast 16 at the face of counter No. 1 north, off new slope.

Section C (samples W31925 and W31926) was measured on the pillar of breast 10, off north gangway 1, off new slope.

Section D (sample W32106) was measured in the air course of the new slope at No. 1 lift, below north gangway 1.

Section E (sample W32107) was a pillar sample, measured in the first crosscut, off breast 14, north gangway 1, off new slope.

Section F (sample W32108) was a face sample, measured in the crosscut on the new slope opposite south gangway 2.

A composite sample was made by mixing samples 31921 to 31926, inclusive, and 32106 to 32108, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 14390.

Duplicate samples Nos. W32104 and W32105 were taken from four cars while being loaded at the mine.

Duplicate samples W32145 and W32146 were taken from four cars while being loaded at the mine.

Sample W32147 was taken from four cars while being loaded at the mine.

Duplicate samples W32158 and W32159 were taken from four cars while being loaded at the mine.

Duplicate samples W32160 and W32161 were taken from four cars while being loaded at the mine.

Duplicate samples W32211 and W32212 were taken from four cars while being loaded at the mine.

Duplicate samples W32213 and W32214 were taken from three cars while being loaded at the mine.

Coal that passed over the screens, constituting about 15 per cent of the total, was dumped into the cars, but no special note was made as to which cars were partly loaded with lump and which were loaded with the coal going through the $2\frac{1}{2}$ -inch screen. The screened coal passed through the washery before being loaded. The above car samples were obtained by taking about 50 pounds of coal from each car as it was being loaded. The 50-pound lots from three or four cars were then combined and the sample quartered down to laboratory size.

Notes.—The Gale Creek mine was opened by slopes and drifts, and the coal was mined by the breast-and-pillar method. All of the undercutting done was by hand; the larger part of the coal was shot off the solid with 30 per cent dynamite. In places the "draw slate" fell with the coal. The tippie was equipped with shaking screens 5 by 16 feet with $2\frac{1}{2}$ -inch holes. None of the coal was shipped as run-of-mine. Approximately 75 to 85 per cent of the coal passed through the screens; after having been screened it went to the washery. The oversize passed on to a picking belt, where it was carefully hand picked prior to being loaded on the car. The screenings were washed, but only one size was produced, although the plant was equipped for yielding two sizes. There was one loading track with a capacity for 12 empty and 15 loaded cars. The storage bins had a capacity for about 850 tons. There was 320 acres of coal land tributary to the various openings. The larger part of the coal was worked out down to the 400-foot level. One-half to three-fourths of the coal produced was from advance workings, the remainder being obtained from robbing the pillars. The mine had a daily production of 100 tons, with a maximum capacity of about 200 tons. Development work was under way and the capacity was to be increased to 250 to 300 tons a day.

For description and analyses of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 221, 899.

WEST VIRGINIA.

BRAXTON COUNTY.

BRAXTON. BRAXTON MINE.

Sample.—Bituminous coal; analysis No. 13556 (p. 110).

Mine.—Braxton; interior district; a mine at Braxton post office, on Coal & Coke Railway.

Coal bed.—Pittsburgh. Carboniferous age; Monongahela formation. Thickness, 4 to over 7 feet; average, nearly 7 feet. The roof is shale in most parts of the mine, but locally it is sandstone, in which case the coal is thinner than elsewhere. Bands of clay from a fraction of an inch to 3 or 4 feet thick cut across the bed in numerous places. Floor, shale.

The sample was collected about 325 feet southeast from the mouth of the mine by E. R. Lloyd, on March 18, 1912. The thickness of the bed where sampled was 5 feet 3 inches, clear coal, all of which was represented in the sample.

The output of the mine at the time of sampling was about two carloads per week.

BROOKE COUNTY.

COLLIERS. LEWIS-FINLEY No. 1 MINE.

Sample.—Bituminous coal; analyses Nos. 15671, 15672 (p. 111).

Mine.—Lewis-Finley No. 1; Wheeling district; a drift mine, on the Pennsylvania Railroad.

Coal bed.—Pittsburgh. Carboniferous age; Monongahela formation. The bed has an average thickness of about $4\frac{1}{2}$ feet and lies nearly flat. Roof, clay or bony coal.

The bed was measured and sampled at two places by D. D. Condit on January 6, 1913, as described below:

Sections of coal bed in Lewis-Finley No. 1 Mine

Section.....	A	B
Laboratory No.....	15671	15672
Roof, clay or bony coal.		
Coal unmeasured.		
Clay, averaging 10 inches.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bony.....	a0 7	.. ..
Coal.....	1 10	2 3
Shale.....	a0 1	a0 1
Coal.....	a0 3 1	a0 3
Shale.....	a0 1	a0 1
Coal.....	0 11 1	1 9 1
Coal, bony.....	a0 1	.. ..
Coal.....	0 8 1	.. ..
Coal, high in "sulphur".....	a0 2	a0 3
Floor, clay.		
Thickness of bed.....	4 7 1	4 8
Thickness of coal sampled.....	3 6	4 1

a Not included in samples.

Section A (sample 15671) was measured in room 1, off butt entry 6, off the main entry.

Section B (sample 15672) was measured in room 77, off entry 10, side No. 2, 5,800 feet northwest of the mine mouth. Cover, 100 feet.

FAYETTE COUNTY.

CAPERTON. SEWELL MINE.

Sample.—Bituminous coal; New River field; analyses Nos. 14344, 14345, 14346, 14347, 14348, 14349, and 14350 (p. 111).

Mine.—Sewell; Kanawha-New River district; a drift mine at Caperton station, on the main line of the Chesapeake & Ohio Railway.

Coal bed.—Sewell. Carboniferous (Pottsville) age. Sewell formation. Average thickness, 3 feet 8 inches; dip, 1½ per cent northeast. The cleat is well marked, and there are no rolls or faults in this mine. The roof consists of a smooth "draw slate" 3 to 9 inches thick, above which is a sandstone cap. Floor, hard, smooth shale. Pieces of the roof occasionally mixed with the coal when loading, but none of the floor material was taken up with the coal. Cover at points of sampling, 250 to 400 feet.

The bed was measured and sampled at five points in the mine by G. H. Deike on July 11, 1912, as described below:

Sections of coal bed in Sewell Mine.

Section.....	A	B	C	D	E
Laboratory No.....	14344	14345	14346	14348	14349
Roof, sandy shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 9	0 6	0 11	0 6	0 10
Coal, gray.....	0 2 1	0 1	0 3	0 3	0 1 1
Coal.....	0 7	.. ..	0 8 1	0 6 1	0 8 1
Coal, gray.....	0 1 1	.. ..	0 1 1	0 1 1	0 1
Coal.....	1 6	1 10	2 0	1 7 1	1 4 1
Mother coal.....	0 1	.. ..	.. ..	0	0 1
Coal.....	0 9 1	.. ..	.. ..	0 7 1	0 9
Coal, bony.....	.. ..	a0 4	a0 2 1	.. ..	a0 2
Floor, clay.					
Thickness of bed.....	4 0	2 9	4 2 1	3 8 1	4 1
Thickness of coal sampled.....	4 0	2 5	4 0	3 8 1	3 11

a Not included in sample.

Section A (sample 14344) was measured at the face of a room turned off at the face of the drainage entry (Sugar Camp No. 3 workings).

Section B (sample 14345) was measured at the face of the last break-through in the third right air course (Sugar Camp No. 1 workings).

Section C (sample 14346) was measured at the face of the thirteenth right entry, 5,000 feet northeast of mine mouth. (Old Hill workings.)

Section D (sample 14348) was measured on pillar at the last room off cross entry 11. (Old Hill workings.)

Section E (sample 14349) was measured on the pillar of right entry 2. (Sugar Camp No. 2 workings.)

Two composite samples were made: (1) by mixing samples 14344, 14345, and 14346 for an ultimate analysis, the results of which are given under laboratory No. 14347; (2) by mixing samples 14348 and 14349 for an ultimate analysis, the results of which are given under laboratory No. 14350.

Notes.—The Sewell mine is opened by a number of drift entries, and the coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut both by hand and by electric chain machines and broken down with FFF black powder and permissible explosives. All of the coal was shipped as run-of-mine. There was a screening plant with 12-foot bar screens spaced $1\frac{1}{4}$ inches apart. The coal was clean and needed no picking when loading. There were 2 loading tracks with a capacity for 14 empty and 20 loaded cars. About 50 per cent of the coal was obtained from advance workings. There was approximately 300 acres of unmined coal tributary to the various entries. The output of the mine was 300 tons a day, with a maximum day's run of 550 days.

DUNLOOP. DUNN LOOP NO. 2 MINE.

Sample.—Semibituminous coal; New River field; analyses Nos. 14383, 14384, 14385, 14386, 14387, 14388, and 14389 (p. 111).

Mine.—Dunn Loop No. 2; Kanawha-New River district; at Dunloop, with railroad connections to the Chesapeake & Ohio Railway. Another road is under construction, the Glen Jean & Eastern, which will connect with the Virginian Railway. This will give an additional outlet for coal shipments.

Coal bed.—Sewell, Carboniferous (Pottsville) age, Sewell formation. Average thickness, 5 feet 6 inches; dip, $1\frac{1}{2}^{\circ}$ northwest. Roof, "draw slate" 4 to 6 inches thick, above which is a stratum of soft gray shale. There is a sandstone cap rock 20 feet above the coal. Floor, smooth, hard fire clay, and shale. Cover at points of sampling, 75 to 200 feet.

The bed was measured and sampled at five points in the mine by J. J. Rutledge on July 10, 1912, as described below:

Sections of coal bed in Dunn Loop No. 2 mine.

Section.....	A	B	C	D	E
Laboratory No.....	14383	14384	14385	14387	14388
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 9	2 7	2 6	2 $2\frac{1}{2}$	2 9
Cannel coal.....	0 $\frac{1}{2}$	0 3	0 3	0 $2\frac{1}{2}$	0 3
Coal.....	2 11	2 9	2 11	2 1	2 10
Shale.....	.. ..	.. ..	.. ..	^a 0 1	.. ..
Coal.....	.. ..	.. ..	.. ..	0 7	.. ..
Floor, fire clay, shale.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	5 8 $\frac{1}{2}$	5 7	5 8	5 2	5 10
Thickness of sampled.....	5 8 $\frac{1}{2}$	5 7	5 8	5 1	5 10

^a Not included in sample.

Section A (sample 14383) was measured at the last break-through, to the right on the fifth main entry, 500 feet northeast of the mouth of the fifth main entry.

Section B (sample 14384) was measured at the face of room 20, off right entry 4, off the fourth main entry 1,600 feet southeast of the mouth of the fourth main entry.

Section C (sample 14385) was measured at the face of room 2, off the first left air course off the sixth main entry, 1,200 feet east of the mouth of the sixth main entry.

Section D (sample 14387) was measured at the face of room 5, off the air course of the third main entry, 500 feet southeast of the mouth of the third main entry.

Section E (sample 14388) was measured on pillar 17 on the sixth main entry, 1,040 feet southeast of the mouth of the sixth main entry.

Two composite samples were made: (1) by mixing samples 14383, 14384, and 14385 for an ultimate analysis, the results of which are shown under laboratory No. 14386; (2) by mixing samples 14387 and 14388 for an ultimate analysis, the results of which are shown under laboratory No. 14389.

Notes.—The Dunn Loop No. 2 mine is opened by six drift entries, and the coal from these various openings all goes to the same tippie. The coal is mined by the room-and-pillar system. At the time the mine was visited the coal was undercut by hand and shot down with FFF black blasting powder and permissible explosives. Thirty per cent dynamite was used for brushing the roof. The tippie was equipped with shaking screens with openings $5\frac{1}{2}$ by $3\frac{1}{2}$ inches and $2\frac{1}{2}$ by $1\frac{1}{2}$ inches in size. Pickers were employed for picking the coal on a traveling belt. The daily production of the mine was 1,000 tons. The coal had a good appearance on the cars, the lumps being large but slightly broken by the loading system. There were 3 loading tracks, with a capacity for 29 empty and 32 loaded cars. All of the coal was shipped as run-of-mine. About 50 per cent of the coal was obtained from new workings and the remainder from the older parts of the mine.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 915-916.

ELVERTON. ELVERTON MINE.

Sample.—Semibituminous coal; New River field; analyses Nos. 14338, 14339, 14340, 14341, 14342, and 14343 (p. 112).

Mine.—Elverton; Kanawha-New River district; a drift mine, $\frac{1}{4}$ mile west of Elverton station on the main line of the Chesapeake & Ohio Railway.

Coal bed.—Carboniferous (Pottsville) age. Sewell formation. Average thickness, 4 feet; dip $1\frac{1}{2}$ per cent northwest. Roof, heavy smooth shale above which there is a sandstone cap rock. The coal is practically free from regular partings or impurities. The floor consists of about 4 inches of bony coal, below which is a hard smooth shale. Cover, at points where the samples were taken, ranges from 100 to 400 feet.

The coal bed was measured and sampled at four points in the mine by G. H. Deike, July 10, 1912, as described below:

Sections of coal bed in Elverton mine.

Section.....	A	B	C	D
Laboratory No.	14338	14339	14341	14342
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, gray.....	0 9	0 10	0 $11\frac{1}{2}$	0 $10\frac{1}{2}$
Coal.....	0 1	0 $1\frac{1}{2}$	0 3	0 $1\frac{1}{2}$
Coal, gray.....	0 7	0 $7\frac{1}{2}$	0 $4\frac{1}{2}$	0 10
Coal.....	0 2	0 1	..	0 1
Mother coal.....	..	..	0 $\frac{1}{2}$	..
Coal.....	1 4	0 7	1 $9\frac{1}{2}$	1 0
Mother coal.....	..	..	0 $\frac{1}{2}$	0 $\frac{1}{2}$
Coal.....	..	..	0 $3\frac{1}{2}$	..
"Sulphur" band.....	..	0 $\frac{3}{8}$	0 $\frac{1}{4}$	..
Coal.....	..	0 6	0 $7\frac{1}{2}$	0 11
Mother coal.....	0 $\frac{1}{4}$	0 $\frac{1}{4}$	..	0 2
Coal.....	0 $5\frac{1}{2}$	0 5	..	0 7
Floor, bone and shale.	..	..	..	..
Thickness of bed.....	3 $4\frac{3}{4}$	3 $2\frac{3}{8}$	4 $2\frac{5}{8}$	4 $7\frac{1}{2}$
Thickness of coal sampled.....	3 $4\frac{3}{4}$	3 $2\frac{3}{8}$	4 $2\frac{5}{8}$	4 $7\frac{1}{2}$

Section A (sample 14338) was measured at the face of the old Bayne entry, 3,900 feet southwest of No. 2 entrance.

Section B (sample 14339) was measured at the corner of the break-through, 10 feet from the face of the main entry, 3,900 feet southwest of No. 2 entrance.

Section C (sample 14341) was measured on pillar of room 2, left entry 1 off left entry 5, 3,100 feet south of No. 2 entrance.

Section D (sample 14342) was measured on the pillar of room 3, right entry 5, 3,100 feet southwest of No. 2 entrance.

Two composite samples were made: (1) by mixing samples 14338 and 14339 for an ultimate analysis, the results of which are shown under laboratory No. 14340; (2) by mixing samples 14341 and 14342 for an ultimate analysis, the results of which are shown under laboratory No. 14343.

Notes.—The Elverton mine is opened by a drift entry and the coal mined by the room-and-pillar system. At the time of sampling the coal was undercut both by hand and by electric chain machines and broken with FFF black powder. Dynamite was used for brushing the roof. The tippie was equipped with shaking screens 5 by 12 feet with openings 5 inches in diameter and also another set of screens 5 by 12 feet with openings $1\frac{1}{4}$ inches in diameter. About 50 per cent of the coal passed through the first set of screens. None of the coal was shipped as run-of-mine. Pickers were employed on the cars when loading coal. The screenings were used for making coke. The coal was very clean, the lumps large, and presented a good appearance on the cars. There were 3 loading tracks with a capacity for 30 empty and 40 loaded cars. There were also storage bins with a capacity for 400 tons of coal. There was about 700 acres of coal tributary to this mine. About one-half of the coal was derived from advance workings and the remainder from pillars. The production of the mine was 250 tons a day with a maximum day's run of 650 tons.

HAWKS NEST. MILL CREEK MINE.

Sample.—Semibituminous coal; New River field; analyses Nos. 14358, 14359, 14360, 14361, and 14362 (p. 112).

Mine.—Mill Creek; Kanawha-New River district; a drift mine about one-half mile north of Hawks Nest station on the main line of the Chesapeake & Ohio Railway.

Coal bed.—Sewell. Carboniferous (Pottsville) age, Sewell formation. Average thickness, 3 feet. The bed is practically horizontal. Roof, heavy shale and bony coal 6 to 18 inches thick, above which is a sandstone cap rock. Floor, hard smooth bony coal. Material from the roof and floor did not become mixed with the coal when mining. Cover, at the points where the samples were taken, approximately 600 feet.

The coal bed was measured and sampled at four points in the mine by H. I. Smith and G. H. Deike, July 12, 1912, as described below:

Sections of coal bed in Mill Creek mine.

Section.....	A 14358	B 14359	C 14360	D 14361
Laboratory No.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, shale and bony coal.....				
Cannel coal.....	0 ..	0 $\frac{3}{4}$	.. ..	.. ..
Coal.....	1 8	1 1	0 9	1 $1\frac{1}{2}$
Coal, gray.....	0 $2\frac{1}{2}$	.. ..	.. ..	0 2
Coal.....	0 11	.. ..	.. ..	0 8
" Sulphur".....	Streak.	Streak.	.. ..	0 $\frac{1}{2}$
Coal, gray.....	.. ..	0 $2\frac{1}{2}$	0 2	.. ..
Coal.....	0 $10\frac{1}{2}$	1 8	1 $6\frac{1}{2}$	0 8
Bone.....	0 $\frac{1}{2}$	.. ..	.. ..	.. ..
Floor, bony coal.....				
Thickness of bed.....	3 $8\frac{1}{2}$	3 0	2 $5\frac{1}{2}$	2 8
Thickness of coal sampled.....	3 $8\frac{1}{2}$	3 0	2 $5\frac{1}{2}$	2 8

Section A (sample 14358) was measured at the face of left entry 1 at room 49.

Section B (sample 14359) was measured at the face of left entry 2 at the neck of room 29.

Section C (sample 14360) was measured at the face of the third left air course.

Section D (sample 14361) was measured at the face of right entry 5.

A composite sample was made by mixing samples 14358, 14359, 14360, and 14361 for an ultimate analysis, the results of which are shown under laboratory No. 14362.

Notes.—The Mill Creek mine was opened by drift entries and the coal mined by the room-and-pillar system. At the time of sampling the coal was undercut by compressed-air punchers and broken down with a permissible explosive, which was also used for brushing the roof. None of the coal was shipped as run-of-mine. The screening plant consisted of bar screens $4\frac{1}{2}$ by 12 feet with 3-inch spaces, through which about 50 per cent of the coal passed. The coal was clean and the lumps were large and presented a good appearance when loaded on the cars. There were two loading tracks with a capacity for 12 empty and 12 loaded cars. About two-thirds of the coal was obtained from advance work and the remainder from pillars. The daily output was 250 tons with a maximum day's run of 400 tons.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 924-925.

KAY MOOR. KAY MOOR NO. 1 AND NO. 2 MINES.

Sample.—Semibituminous coal; New River field; analyses Nos. 14294, 14295, 14296, 14297, 14298, 14299, 14401, 14402, 14403, and 14404 (p. 113).

Mine.—Kay Moor No. 1 and No. 2, Kanawha-New River district; three-fourths mile south of Kay Moor, on the south side of New River with railway connections to the Chesapeake & Ohio Railway. No. 2 mine is also on the south side of the river with railway connections to the Chesapeake & Ohio Railway at South Fayette.

Coal bed.—Carboniferous (Pottsville) age, Sewell formation. Average thickness about 3 feet 6 inches; slight dip to the west. Roof, smooth sandstone 18 inches thick; floor, rough, hard clay. Material from the floor or roof did not become mixed with the coal in mining.

The coal bed was measured and sampled at five points in No. 1 mine and at three points in No. 2 mine by H. I. Smith on July 10 and 11, 1912, as described below:

Sections of coal bed in Kay Moor No. 1 mine.

Section.....	A	B	C	D	E
Laboratory No.....	14294	14295	14296	14297	14299
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Cannel coal.....	0 11	0 11½	0 3	0 11	0 9
Coal.....	0 4½	0 7½	0 7	0 8	0 7
Coal, gray.....	1 1	1 6	1 3½	0 10	1 2
Coal.....	Streak.	0 ½	Streak.	0 ½	Streak.
"Sulphur" band.....	1 3	0 8	0 8	0 8½	0 9
Coal.....	0 1	0 1½	0 1	0 1	0 1
Coal, bony.....					
Floor, clay.....					
Thickness of bed.....	3 8½	3 10½	3 6½	3 3	3 4
Thickness of coal sampled.....	3 8½	3 10½	3 6½	3 3	3 4

Section A (sample 14294) was measured at the face of room 1, left entry 3, off main entry 3, at 4,700 feet south of the mine mouth.

Section B (sample 14295) was measured at the face of right entry 1½, off left entry 1, off Buffalo entry, 3,300 feet southeast of the mine mouth.

Section C (sample 14296) was measured at the face of left entry 1, off right entry 9, at 3,300 feet west of the mine mouth.

Section D (sample 14297) was measured at the face of west entry 11, 3,600 feet southwest of the mine mouth.

Section E (sample 14299) was measured on the pillar between rooms 3 and 4, off right entry 1, off main entry 7.

A composite sample was made by mixing samples 14294, 14295, 14296, and 14297. The results of an ultimate analysis of this sample are shown under laboratory No. 14298.

Sections of coal bed in Kay Moor No. 2 mine, south of Kay Moor.

Section.....	A	B	C
Laboratory No.....	14401	14402	14403
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 0	0 9	0 9½
Coal, gray.....	.. ..	0 3	0 2
Coal.....	.. ..	1 10	1 3
"Sulphur" band.....	.. ..	.. ..	Streak.
Coal.....	.. ..	.. ..	0 9
Coal, bony.....	.. ..	0 1½	0 1
Floor, shale.....	.. ..	.. ..	.. ..
Thickness of bed.....	3 0	2 11½	3 ½
Thickness of coal sampled.....	3 0	2 11½	3 ½

Section A (sample 14401) was measured at the face of left entry 3, off the main entry.

Section B (sample 14402) was measured at the face of room 9, off left entry 2.

Section C (sample 14403) was measured at the face of room 9, off left entry 1, at 150 feet from the entry.

A composite sample was made by mixing samples 14401, 14402, and 14403, for an ultimate analysis, the results of which are shown under laboratory No. 14404.

Notes.—Kay Moor No. 1 and No. 2 mines are opened by slope and the coal is mined by the room-and-pillar system. At the time the mines were visited the coal was undercut by air punchers and electric chain cutters and broken down with FFFF black blasting powder. None of the coal was shipped as run-of-mine. The screening plant had bar screens spaced 4 inches apart through which about 66 per cent of the coal passed, and also smaller bar screens with spaces 1½ inches wide which produced an egg coal. There were three loading tracks with a capacity for 16 empty and 16 loaded cars. There were storage bins with a capacity for 400 tons of screened coal and 600 tons of screenings. The screenings were not washed but were sent to the coking plant. About 10,000 acres of coal land was owned by the company, of which about 500 acres had been worked. The daily output of No. 1 mine was 550 tons, with a maximum day's run of 750 tons. The output of this mine will probably be increased to about 850 tons in the near future. Daily output of No. 2 mine, about 90 tons.

SOUTH NUTTAL. BROWN MINE.

Sample.—Semibituminous coal; New River field; analyses Nos. 10618, 10619, 10620, 10621, 10622, and 10623 (p. 113).

Mine.—Brown; Kanawha-New River district; a drift mine at South Nuttal on the Chesapeake & Ohio Railway.

Coal bed.—Sewell. Carboniferous (Pottsville) age, Sewell formation. Thickness, 3 to 4 feet; dip, 3° west; small faults; roof, blue shale 6 feet thick, strong and smooth; floor, hard smooth clay; cover 120 to 350 feet.

The bed was measured and sampled at five points in the mine by J. J. Rutledge on June 22, 1910, as described below:

Sections of coal bed in Brown mine.

Section.....	A	B	C	D	E
Laboratory No.....	10618	10619	10620	10621	10622
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 8½	0 10½	0 10	0 10	.. 10
Coal, hard.....	0 1½	0 ½	0 1	0 1½	.. 1
Coal.....	2 0	2 11	2 6	2 6½	2 6½
Coal, bony.....	a 0 8	.. ..	.. ..	.. ..	.. ..
Floor, clay.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 6	3 9½	3 5	3 6	3 5½
Thickness of coal sampled.....	2 10	3 9½	3 5	3 6	3 5½

a Not included in sample.

Section A (sample 10618) was measured at the face of room 2 off Hill entry.

Section B (sample 10619) was measured on rib of Lockett heading, between rooms 1 and 2, about 2,000 feet from mouth of entry.

Section C (sample 10620) was measured at the neck of room 1 off right entry 6 off Wheeler entry.

Section D (sample 10621) was measured at the neck of room 4 off left entry 2 off entry 18.

Section E (sample 10622) was measured on the left rib near the face of entry 18.

A composite sample was made by mixing samples 10618 to 10622, inclusive; the results of an ultimate analysis of this sample are given under laboratory No. 10623.

Notes.—The coal is mined by the room-and-pillar and modified panel system; at the time of sampling FFF black blasting powder was used for breaking down the coal after undercutting with electric chain cutters. The coal was screened on 1½-inch bar screens, and marketed as lump and screenings; pickers were employed on the cars when loading; there were two loading tracks with capacity for about 20 cars. Output 550 tons per day.

THAYER. EPHRAIMS CREEK (BUFFALO) MINE.

Sample.—Semibituminous coal; New River field; analysis No. 10629 (p. 114).

Mine.—Ephraims Creek (Buffalo); Kanawha-New River district; a drift mine at Thayer, on the Chesapeake & Ohio Railway.

Coal bed.—Fire Creek. Carboniferous age, Pottsville formation. Average thickness, 42 inches; dip, 3° west; roof, strong dark gray shale about 4 feet thick; floor, hard smooth gray shale; coal bed contains some cannel coal.

The bed was measured and sampled at one point in the mine by J. J. Rutledge, on June 20, 1910, as described below:

Section of coal bed in Ephraims Creek (Buffalo) mine.

Section.....	A
Laboratory No.....	10629
Roof, shale.....	<i>Ft. in.</i>
Coal.....	1 1
Cannel coal.....	0 5
Coal.....	2 0
Floor, clay.....	
Thickness of bed.....	3 6
Thickness of coal sampled.....	3 6

This section (sample 10629) was measured at the face of room 5 off right entry 5 off the Slater entry.

Notes.—The mine is worked by the room-and-pillar system. At the time of sampling FFF black powder was used for breaking coal after undercutting with electric chain cutters. The coal was screened over 1½-inch bar screens, and the screenings were passed over a ¾-inch screen. Pickers were employed on the car when loading; the capacity of the storage bins was 200 tons. There were two loading tracks. Practically all of the coal produced was from advanced workings. Daily output, 1,100 tons.

GREENBRIER COUNTY.

RICHWOOD. SPRUCE KNOB MINE.

Sample.—Bituminous coal; analysis No. 13547 (p. 114).

Mine.—Spruce Knob; Interior district on north fork of Cherry River, 9 miles southeast of Richwood, on a lumber road.

Coal bed.—Sewell (?). Carboniferous age, Pottsville formation.

The bed was measured and sampled in a room 1,500 feet southwest of the mine mouth, on March 15, 1912, by E. R. Lloyd. The section of the bed at the point of sampling was as follows:

Section of coal bed in Spruce Knob mine.

Laboratory No.....	13547
Roof, shale.....	<i>Ft. in.</i>
Coal, bony.....	a 0 9
Coal, good, soft.....	4 1
Floor, shale.....	
Thickness of bed.....	4 10
Thickness of coal sampled.....	4 1

a Not included in sample.

Notes.—The average thickness of the bed is 4 feet. At the time of sampling the average daily output of the mine was about 150 tons.

MCDOWELL COUNTY.

ALGOMA. PINEY MINE.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 14154, 14155, 14156, 14157, 14158, 14159, 14160, 14161, and 14162 (pp. 114, 115).

Mine.—Piney; Norfolk & Western district; a drift mine about 1 mile east of Algoma, with railroad connections to the Norfolk & Western Railway at Northfork.

Coal bed.—Pocahontas No. 3. Carboniferous (Pottsville) age, Pocahontas formation. Average thickness, 5 feet 3 inches; roof, 18 inches of "draw slate," above which is 6 inches of black shale with a sandstone cap rock. Floor, smooth hard shale. Material from the floor did not become mixed with the coal in mining, but occasionally some of the roof material fell with the coal.

The bed was measured and sampled at seven points in the mine by G. H. Deike, D. J. Price, and E. B. Sutton, June 22, 1912, as described below:

Sections of coal bed in Piney mine.

Section.....	A	B	C	D	E	F	G
Laboratory No.....	14154	14155	14156	14158	14159	14160	14161
Roof, shale and sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 9½	1 6½	1 7	2 6	1 7	2 2	2 6
Coal, gray.....	0 2½	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Coal.....	0 7	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Bone.....	a 0 3	a 0 1½	a 0 3	a 0 3	a 0 3	a 0 3½	a 0 3
Coal.....	4 3	3 7	3 8	3 10	3 8	3 10½	3 10
Floor, shale.....							
Thickness of bed.....	6 1	5 3	5 6	6 7	5 6	6 4	6 7
Thickness of coal sampled.....	5 10	5 1½	5 3	6 4	5 3	6 ½	6 4

a Not included in sample.

Section A (sample 14154) was measured at the face of the main entry.

Section B (sample 14155) was measured at the face of room 14 off cross entry 10.

Section C (sample 14156) was measured at the face of room 30 off cross entry 8.

Section D (sample 14158) was measured on the pillar of room 15 off cross entry 5.

Section E (sample 14159) was measured on the rib of room 33 off cross entry 7.

Section F (sample 14160) was measured on the pillar of room 15 off cross entry 6.

Section G (sample 14161) was measured on the pillar of room 8 off cross entry 3.

A composite sample was made by mixing face samples 14154, 14155, and 14156. The results of an ultimate analysis of this sample are given under laboratory No. 14157. Another composite sample was made by mixing pillar samples 14158 to 14161, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 14162.

Notes.—The Piney mine is opened by drift entries and the coal mined by the room-and-pillar system. At the time the mine was visited the coal was undercut by hand; FFF black powder was used for breaking the coal and a permissible explosive for brushing the roof. The screening plant was equipped with bar screens, 14 feet long, 3-inch spaces; also shaking screens 5 by 10 feet, with $\frac{1}{4}$ and $\frac{1}{2}$ -inch openings. About 65 per cent of the coal passed through the first screen. Pickers were employed on the car when loading coal. About 100 tons of screenings were coked per day. Daily output of mine, 1,000 tons. There were two loading tracks, with a capacity for 55 empty and 44 loaded cars. There were storage bins with a capacity for 800 tons. The coal was obtained from both advance and pillar work, and there was an ample acreage of coal for many years mining.

For analyses and descriptions of other samples of coal from this mine, see Bull. 22, Bureau of Mines, 1913, p. 966.

BIG FOUR. CIRRUS NO. 2 MINE.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 14218, 14219, 14220, 14221, 14222, and 14223 (p. 115).

Mine.—Cirrus No. 2, Norfolk & Western district; a slope mine, at Big Four post office, on the Norfolk & Western Railway.

Coal bed.—Pocahontas No. 3 and Pocahontas No. 4. Carboniferous (Pottsville) age, Pocahontas formation. Average thickness 5 feet 5 inches; slight dip to south. The roof is a shale 3 to 4 feet thick, above which is a sandstone cap rock. The floor is a hard, rough fire clay. Material from the roof and floor did not become mixed with the coal in mining. Cover, at points of sampling, about 400 feet.

The bed was measured and sampled at five points in the mine by J. J. Rutledge and D. J. Price, on June 29, 1912, as described below:

Sections of coal beds in Cirrus No. 2 mine.

Section.....	No. 3 bed.				No. 4 bed.
	A 14218 Ft. in.	B 14219 Ft. in.	C 14220 Ft. in.	D 14221 Ft. in.	E 14223 Ft. in.
Roof, shale.....	1 7 $\frac{1}{2}$	2 $\frac{1}{2}$	1 7 $\frac{1}{2}$	1 9	1 8 $\frac{1}{2}$
Coal.....	a 0 6 $\frac{1}{2}$	a 0 3	a 0 5 $\frac{1}{2}$	a 0 5 $\frac{1}{2}$	a 0 3
Coal, bony.....	.. ..	.. ..	.. ..	.. ..	1 1
Coal.....	.. ..	.. ..	.. ..	.. ..	a 0 2
Coal, bony.....	.. ..	.. ..	.. ..	.. ..	1 5
Coal.....	3 5	3 2	3 7	3 0	.. ..
Floor, fire clay.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	5 7	5 5 $\frac{1}{2}$	5 8	5 2 $\frac{1}{2}$	4 7 $\frac{1}{2}$
Thickness of coal sampled.....	5 $\frac{1}{2}$	5 2 $\frac{1}{2}$	5 2 $\frac{1}{2}$	4 9	4 2 $\frac{1}{2}$

a Not included in sample.

Section A (sample 14218) was measured at the break-through near the face of the main heading, 2,850 feet south of the slope mouth.

Section B (sample 14219) was measured about 30 feet from the face of the sixth south entry, 1,500 feet southwest of the slope mouth.

Section C (sample 14220) was measured at the face of room 4, off the third south heading, 2,850 feet south of the slope mouth.

Section D (sample 14221) was measured at the face of the sixth east heading, 2,100 feet south of the slope mouth.

Section E (sample 14223) was measured at the face of the second north entry, 250 feet northwest of the slope mouth. This sample was taken in Pocahontas No. 4 bed, which is 4 feet 7 $\frac{1}{2}$ inches thick.

A composite sample was made by mixing face samples 14218 to 14221, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 14222.

Notes.—The mine is opened by a slope and the coal mined by the room-and-pillar system. At the time of sampling the coal was undercut by electric punchers and broken down with FFF black powder. There was no screening plant, all of the coal being shipped as run-of-mine. Pickers were employed on the cars in loading. There were two loading tracks with a capacity for 11 empty cars and 21 loaded cars for pit No. 3 and 9 empty cars and 7 loaded cars for pit No. 4. There was approximately 500 acres of unmined coal tributary to this slope. All of the coal mined was from advance workings. The daily output was about 400 tons.

HUGER. MIDDLE STATES MINE.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 14416, 14417, 14418, 14419, 14421, 14422, and 14423 (p. 115).

Mine.—Middle States; Norfolk & Western district; a shaft mine at Huger station (Olmsted post office) 2 miles from Welch, on the main line of the Norfolk & Western Railway.

Coal bed.—Pocahontas No. 4. Carboniferous age, Pottsville formation. Average thickness about 5 feet. Roof, sandstone; floor, shale.

The bed was measured and sampled at seven points in the mine by E. B. Sutton and H. I. Smith, June 27, 1912, as described below:

Sections of coal bed in Middle States (Helena) mine.

Section.....	A		B		C		D		E		F		G	
Laboratory No.....	14416		14417		14418		14419		14421		14422		14423	
Roof, sandstone.	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Coal.....	0	4½	0	1½	0	4½	1	10½	0	4½	0	1½	0	4
Bone.....	a 0	1	a 0	1	a 0	1	0	½	a 0	1½	a 0	½	a 0	1
Coal.....	1	11	1	11½	1	10½	2	0	1	8	0	2	1	8
Bone.....	a 0	1	a 0	1	a 0	1	a 0	½	0	½	0	¼	a 0	½
Coal.....	1	8½	1	10	2	1	0	5	1	4	1	9	2	2
Bone.....	a 0	1	a 0	3	a 0	2½	a 0	1	..	..	a 0	¼	a 0	2
Coal, gray.....	..	..	..	..	..	..	..	..	0	2	..	..	..	..
Coal.....	0	10½	1	1	1	1	1	1	0	11	1	8	1	2
Coal, bony.....	..	..	..	..	..	..	..	..	..	..	0	1½	..	..
Coal.....	..	..	..	..	..	..	..	..	..	..	0	1½	..	..
Floor, shale.														
Thickness of bed.....	5	1½	5	5	5	9½	5	6½	4	7½	4	1	5	7½
Thickness of coal sampled..	4	10½	5	0	5	5	5	5	4	6	3	11½	5	4

a Not included in sample.

Section A (sample 14416) was measured at the face of room 6 off the second rock heading.

Section B (sample 14417) was measured at the face of the second right air course.

Section C (sample 14418) was measured on the rib of the last break-through on the main diagonal entry.

Section D (sample 14419) was measured at the face of room 4 off first west parallel heading.

Section E (sample 14421) was measured on the pillar between rooms 3 and 6 off the north entry.

Section F (sample 14422) was measured on the pillar between rooms 8 and 9, left entry 4 off the main west heading.

Section G (sample 14423) was measured on the pillar between rooms 20 and 21, off second parallel entry off the main diagonal heading.

Two composite samples were made: (1) By mixing samples 14416 to 14419, inclusive, for an ultimate analysis, the results of which are shown under laboratory No. 14420; (2) by mixing samples 14421 to 14423, inclusive, for an ultimate analysis, the results of which are shown under laboratory No. 14424.

Notes.—The Middle States mine is opened by shaft 182 feet deep, and the coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut by electric machines and shot down with permissible explosives. Dynamite was used for brushing the roof. All of the coal was shipped as run-of-mine. Pickers were employed on the car when loading. There were 2 loading tracks with a capacity for 70 empty and 30 loaded cars. Daily output, 1,000 tons. There was sufficient unmined coal to insure many years operation.

JED. HAVACO MINE.

Sample.—Semibituminous coking coal; Pocahontas field; analysis No. 13775 (p. 116).

Mine.—Havaco (formerly Jed); Norfolk & Western district; a shaft mine at Jed, on the Tug Fork branch of the Norfolk & Western Railway.

Coal bed.—Known as Pocahontas No. 3, Carboniferous (Pottsville) age, Pocahontas formation. The thickness is uniform and ranges from 4 feet 8 inches to 5 feet 4 inches, with an average of 5 feet. Dip, about $1\frac{1}{2}^{\circ}$ to $2\frac{1}{2}^{\circ}$ northwest. Roof, strong bedded sandstone underlain in parts with 12 to 15 inches of treacherous shale, which did not regularly fall with the coal, but was brushed in the entries. Floor, 12 to 18 inches of hard clay with smooth surface. Cover, about 400 feet.

The coal bed was measured and sampled at one point in the mine by J. W. Paul, April 5, 1912, as described below:

Sections of coal bed in Havaco (formerly Jed) mine.

Laboratory No.	13775	
	<i>Ft.</i>	<i>in.</i>
Roof, dark shale.....	0	5½
Coal.....	0	½
Mother coal.....	0	6
Coal.....	0	6
Mother coal.....	0	½
Coal.....	0	10
Bone.....	α 0	4
Coal.....	2	11
Floor, hard clay.....		
Thickness of bed.....	5	1½
Thickness of coal sampled.....	4	9½

α Not included in sample.

Sample 13775 was measured at the face of first butt left entry.

Notes.—At the time of sampling the coal was undercut with chain machines in the bottom part of the seam and shot down with a permissible explosive. The tippie had no storage bins. The entire output was shipped as run-of-mine. There were three loading tracks with a capacity for 75 railroad cars.

For analyses and descriptions of other samples of coal from this mine, see Bureau of Mines Bull. 22, 1914, pp. 261, 993, 994.

JENKINJONES. POCAHONTAS NOS. 6, 6B, AND 7A MINES.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 14185, 14186, 14187, 14188, 14189, and 14190 (p. 116.)

Mine.—Pocahontas Nos. 6, 6B, and 7A; Norfolk & Western district; drift mines; No. 6 mine is at Jenkinjones, on the Tug Fork branch of the Norfolk & Western Railway, and No. 6B and No. 7A are one-half mile south of Jenkinjones.

Coal bed.—Pocahontas No. 3. Carboniferous (Pottsville) age, Pocahontas formation. Average thickness, 10 feet. Roof, dark shale, which is smooth and does not mix with the coal when mining. Floor, smooth hard shale, which does not adhere to the coal. Cover, approximately 300 feet.

The bed was measured and sampled at five points in the mine by J. J. Rutledge, G. H. Deike, and D. J. Price on June 26, 1912, as described below:

Sections of coal bed in Pocahontas Nos. 6, 6B, and 7A mines.

Section.....	A		B		C		D		E	
Laboratory No.....	14185		14186		14187		14189		14190	
Roof, dark shale.....	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Coal.....	1	6	2	8	2	10	3	3	3	0
Gray coal to sulphur.....	0	$\frac{1}{2}$	0	$\frac{1}{2}$	..	..	0	$\frac{1}{2}$	..	..
Coal.....	1	6	0	5	..	..	..	..	..	..
Mother coal.....	0	1	..	..	..	..	..	..	..	..
Coal, bony.....	..	..	a 0	$4\frac{1}{2}$	a 0	$4\frac{1}{2}$	..	..	a 0	$3\frac{1}{2}$
Coal.....	..	9	..	$5\frac{1}{2}$	0	4	0	9	0	$8\frac{1}{2}$
Coal, bony.....	a 0	$3\frac{1}{2}$	a 0	2	a 0	$2\frac{1}{2}$	0	$1\frac{1}{2}$	..	..
Coal.....	0	4	0	6	0	8	0	$11\frac{1}{2}$	..	..
Coal, gray.....	0	1	..	..	..	..	0	$\frac{1}{2}$	..	..
Coal, bony.....	..	..	a 0	$2\frac{1}{2}$	a 0	6	..	..	..	..
Coal.....	1	10	2	$3\frac{1}{2}$	1	5	0	2	..	..
Coal, bony.....	a 0	3	a 0	3	a 0	$\frac{1}{2}$	a 0	6	0	5
Coal.....	2	10	2	10	4	2	4	4	a 3	5
Floor, light shale.....	..	..	..	..	..	..	..	..	..	..
Thickness of bed.....	9	6	10	$2\frac{1}{2}$	10	$6\frac{1}{2}$	9	4	7	10
Thickness of coal sampled.....	8	$11\frac{1}{2}$	9	$2\frac{1}{2}$	9	5	8	10	7	$1\frac{1}{2}$

a Not included in sample.

Section A (sample 14185) was measured at the face of the main heading of No. 6 mine, 250 feet west of the mine mouth.

Section B (sample 14186) was measured at the face of the aircourse of No. 6 mine, 250 feet from the mine mouth.

Section C (sample 14187) was measured at the face of the main heading of 6-B mine, 500 feet from the mine mouth.

Section D (sample 14189) was measured at the face of the first right cross heading of No. 6-B mine, 350 feet from the mine mouth.

Section E (sample 14190) was measured at the face of the main heading of Pocahontas No. 7-A mine, 120 feet from the mine mouth.

A composite sample was made by mixing face samples 14185, 14186, and 14187. An ultimate analysis of this sample is given under laboratory No. 14188.

Notes.—Both No. 6 and No. 7A mines are new and are opened by drift entries. The room-and-pillar system of mining is used. At the time of sampling the coal was undercut by electric machines and shot down with FFF black powder. The tippie was a temporary structure, the permanent plant being in course of construction. No. 6 mine had a daily output of 75 tons; No. 6B mine of 400 tons, and No. 7A was not shipping.

LECKIE. LECKIE No. 1 AND No. 2 MINES.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 14271, 14272, 14273, 14274, 14275, 14276, 14277, 14278, 14279, 14280, 14281, and 14282 (pp. 116–117).

Mine.—Leckie No. 1 and No. 2; Norfolk & Western district; drift mines one-half mile east of Leckie on the Tug Fork branch of the Norfolk & Western Railway.

Coal bed.—Pocahontas No. 3. Carboniferous (Pottsville) age, Pocahontas formation. Average thickness, 7 feet 6 inches; dip, about $1\frac{1}{2}$ per cent northwest. Roof, dark shale about 9 inches thick, above which is a strong cap rock; floor, hard, smooth clay. The material from the floor did not become mixed with the coal when mining, but a small amount of the shale from the roof fell with the coal. Cover, 150 to 200 feet.

The bed was measured and sampled at five points in the No. 1 mine by G. H. Deike on July 6, 1912, as described below:

Sections of coal bed in Leckie No. 1 mine.

Section.....	A	B	C	D	E
Laboratory No.....	14271	14272	14273	14274	14275
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 10	0 10	0 10	0 11	0 10
"Sulphur" band.....	a 0 $\frac{3}{4}$	a 0 1	a 0 1	a 0 1	a 0 $\frac{1}{2}$
Coal.....	1 10 $\frac{1}{2}$	1 10	1 $\frac{1}{2}$	1 3 $\frac{1}{2}$	1 5
Coal, gray.....	..	..	0 6	0 1	..
Mother coal.....	..	..	..	..	0 1
Coal.....	..	..	0 5	0 1	0 4
Coal, bony.....	a 0 3 $\frac{1}{2}$	a 0 6	a 0 2	a 0 3 $\frac{1}{2}$	a 0 4
Coal.....	1 6	2 2	..	1 11	1 5
Coal, gray.....	0 $\frac{1}{2}$	0 $\frac{1}{2}$	1 7	..	..
Coal.....	..	0 8	0 11	..	..
Coal, gray.....	..	0 2	0 4	0 1	..
Coal.....	3 7	1 0	..	..	..
Mother coal.....	..	0 $\frac{1}{2}$	..	..	0 1
Coal.....	..	0 9 $\frac{1}{2}$	2 0	2 6	2 9
Floor, clay.....	..	..	..	..	..
Thickness of bed.....	8 2 $\frac{1}{4}$	8 1 $\frac{1}{2}$	7 10 $\frac{1}{2}$	7 3	7 4 $\frac{1}{2}$
Thickness of coal sampled.....	7 10	7 6 $\frac{1}{2}$	7 7 $\frac{1}{2}$	6 10 $\frac{1}{2}$	6 11 $\frac{1}{2}$

a Not included in sample.

Section A (sample 14271) was measured at the face of room 1, off Monkey heading, 1,700 feet west of the mine mouth.

Section B (sample 14272) was measured at the face of Monkey heading, 1,900 feet west of the mine mouth.

Section C (sample 14273) was measured at the face of Kick-back heading, 1,250 feet northwest of the mine mouth.

Section D (sample 14274) was measured on a chain pillar of first right heading, 650 feet north of the mine mouth.

Section E (sample 14275) was measured on the pillar at the mouth of room 1, off second right heading, 950 feet northwest of the mine mouth.

A composite sample was made by mixing face samples 14271 to 14275, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 14276.

The bed was measured and sampled at five points in the No. 2 mine by H. I. Smith on July 6, 1912, as described below:

Sections of coal bed in Leckie No. 2 mine.

Section.....	A	B	C	D	E
Laboratory No.....	14277	14278	14279	14280	14281
Roof, "draw slate".....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Blocky coal.....	..	0 1	0 1	0 1	0 1
Coal.....	1 1	0 9	0 10	0 9	0 9 $\frac{1}{2}$
"Sulphur" band.....	a 0 1	b 0 1	b 0 1	b 0 1	b 0 $\frac{1}{2}$
Coal.....	1 8	..	1 9	2 1	1 1
Coal, gray.....	..	0 3	..	..	0 4
Coal.....	..	1 6	..	..	0 6
Bone.....	b 0 5	b 0 3	b 0 5	b 0 4	b 0 6
Coal.....	4 6	1 6	1 8	1 8	1 10
Coal, gray.....	..	1 3	0 4	0 3	0 4
Coal.....	..	..	0 4	0 8	..
Coal, gray.....	..	..	..	0 4	..
Mother coal.....	..	0 1	..	..	..
Coal.....	..	1 10	2 5	1 8	2 10
Floor, clay.....	..	..	..	..	..
Thickness of bed.....	7 9	7 6	8 0	7 11	8 4
Thickness of coal sampled.....	7 4	7 2	7 6	7 6	7 9 $\frac{1}{2}$

a Too brittle to exclude.

b Not included in sample.

Section A (sample 14277) was measured at the face of room 17 off the first right air course, 100 feet from the outcrop.

Section B (sample 14278) was measured at the working face.

Section C (sample 14279) was measured at the face of the main straight entry, 600 feet southeast of the mine mouth.

Section D (sample 14280) was measured at the face of room 5 off the diagonal entry.

Section E (sample 14281) was measured at the face of the first left entry, 1,300 feet from the mine mouth.

A composite sample was made from face samples 14277 to 14281, inclusive. The result of an ultimate analysis of this sample are given under laboratory No. 14282.

Notes.—The Leckie No. 1 and No. 2 mines are opened by drift entries and the coal mined by the room-and-pillar system. At the time the mines were visited electric chain machines were used in No. 1 mine for undercutting the coal and permissible explosives for breaking the coal. Daily output, 450 tons. About 30 per cent of the coal was obtained from advance workings. There was approximately 25 acres of unmined coal tributary to this entry. Coal-cutting machines were not used in No. 2 mine. Permissible explosives were used for breaking the coal. The capacity of No. 2 mine was 450 tons per day. A large part of the coal was obtained from advance workings. There was approximately 35 acres of coal tributary to this mine. All the coal from both mines was shipped as run-of-mine. Pickers were employed on the cars in loading. There was one loading track with a capacity for 20 empty and 30 loaded cars.

RODERFIELD. DAVY-POCAHONTAS NO. 1 AND NO. 2 MINES.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 14262, 14263, 14264, 14266, 14267, and 14268 (p. 117).

Mine.—Davy-Pocahontas No. 1 and No. 2; Norfolk & Western district; drift mines. No. 1 mine is $1\frac{1}{4}$ miles and No. 2 mine 2 miles east of Roderfield on the Spice Creek branch of the Norfolk & Western Railway.

Coal bed.—No. 1 mine is in the War Creek bed. Carboniferous age, Pottsville formation. Average thickness of bed, 6 feet. The roof is sandstone, to which a small amount of coal adheres. Floor, sandstone. No. 2 mine is in the Davy bed, Carboniferous age, Pottsville formation. Average thickness of bed, 3 feet 6 inches. Roof, smooth sandstone; floor, black carbonaceous shale which is hard and smooth. Material from the floor occasionally becomes mixed with the coal in mining. Cover at No. 2 mine, 200 to 300 feet.

The coal bed in No. 1 mine was measured and sampled at three points in the mine by H. I. Smith on July 5, 1912, and the bed in No. 2 mine was measured and sampled at three points by G. H. Deike on July 5, 1912, as described below:

Sections of coal bed in Davy-Pocahontas No. 1 mine.

Section.....	A	B	C
Laboratory No.....	14266	14267	14268
Roof, sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 9	1 1	0 3 $\frac{1}{2}$
"Sulphur" band.....	.. ..	.. ..	a0 0 $\frac{1}{2}$
Coal.....	.. ..	.. ..	0 4
Coal, gray.....	0 5	0 5	0 4
Coal.....	0 8	0 6 $\frac{1}{4}$	0 1
Mother coal and "sulphur".....	0 0	0 0 $\frac{1}{4}$	0 0
Coal.....	1 6 $\frac{3}{4}$	1 9	1 2 $\frac{1}{2}$
Mother coal and "sulphur".....	.. ..	.. ..	0 0
Coal.....	.. ..	.. ..	0 7 $\frac{1}{2}$
Coal, bony.....	a0 5	a0 7	a0 5
Coal, very soft.....	0 1	.. ..	.. ..
Coal.....	1 11	2 3 $\frac{1}{2}$	2 0
Coal, bony.....	a0 3	a0 2	a0 4
Floor, sandy shale.....	.. ..	.. ..	.. ..
Thickness of bed.....	6 1	6 10 $\frac{1}{2}$	5 8 $\frac{1}{2}$
Thickness of coal sampled.....	5 5	6 1 $\frac{1}{2}$	4 10 $\frac{1}{2}$

a Not included in sample.

Section A (sample 14266) was measured at the face of room 3, off entry 2.

Section B (sample 14267) was measured at the face of entry 2, opposite room 9

Section C (sample 14268) was measured at the face of entry 7, at the mouth of room 15.

A composite sample was made by mixing face samples 14266, 14267, and 14268. The results of an ultimate analysis of this sample are given under laboratory No. 14269.

Sections of coal bed in Davy-Pocahontas No. 2 mine.

Section.....	A	B	C
Laboratory No.....	14262	14263	14264
Roof, sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	.. ..	0 3	.. ..
Mother coal.....	.. ..	0 $\frac{1}{2}$	.. ..
Coal.....	2 10 $\frac{1}{2}$	0 11 $\frac{1}{2}$	1 1
Coal, gray.....	.. ..	.. ..	0 1
Mother coal.....	.. ..	0 $\frac{3}{4}$	.. ..
Coal.....	.. ..	0 3 $\frac{1}{4}$	0 4
Coal, gray.....	.. ..	0 1	.. ..
"Sulphur" band.....	.. ..	.. ..	0 0 $\frac{3}{4}$
Coal.....	.. ..	0 7	1 2 $\frac{1}{2}$
Shale, hard.....	0 2	0 1 $\frac{1}{2}$	0 0 2
Coal.....	0 2	0 2	0 2
Shale, soft, block.....	0 6	0 6	0 6
Floor, sandy shale.....	.. ..	.. ..	.. ..
Thickness of bed.....	3 8 $\frac{1}{2}$	2 11 $\frac{1}{2}$	3 6 $\frac{7}{8}$
Thickness of coal sampled.....	3 $\frac{1}{2}$	2 4 $\frac{1}{4}$	2 10 $\frac{1}{2}$

a Not included in sample.

Section A (sample 14262) was measured at the face of room 5, left entry 1, 500 feet southwest of the mine mouth.

Section B (sample 14263) was measured at the face of the first left air course, 600 feet southwest of the mine mouth.

Section C (sample 14264) was measured at the face of the main heading, 600 feet west of the mine mouth.

A composite sample was made by mixing face samples 14262, 14263, and 14264. The results of an ultimate analysis of this sample are given under laboratory No. 14265.

Notes.—No. 1 mine is opened by a drift entry. The coal is mined by irregular tunneling intended for the room-and-pillar system. The mine is not well laid out. At the time of sampling coal cutters were not used. No. 2 mine was new; the main entry was about 600 feet long. At the time of sampling the work was largely development. Electric chain coal cutters were used for undercutting the coal. Black powder was used for breaking the coal in both mines and also for taking up the floor. All of the coal from No. 1 mine was shipped as run-of-mine. The coal from No. 2 mine was passed over bar screens with spaces 1 $\frac{1}{4}$ inches wide. Sixty per cent of the coal passed through this screen. Pickers were employed on the cars in loading. The coal on the cars was very clean; the lumps were large and had a good appearance. There were two loading tracks with a capacity for 20 empty and 20 loaded cars. Daily output of No. 1 mine, 150 tons; of No. 2 mine, 80 tons. There was approximately 1,000 acres of unmined coal tributary to these mines.

ROLFE. ROLFE MINE.

Sample.—Semibituminous coal, Pocahontas field; analyses Nos. 14394, 14395, 14396, 14397, 14398, and 14400 (p. 117).

Mine.—Rolfe; Norfolk & Western district; a drift mine at Rolfe on the North Fork branch of the Norfolk & Western Railway, 3 miles from North Fork.

Coal bed.—Pocahontas No. 3. Carboniferous age, Pottsville formation. Average thickness, about 5 feet 2 inches. The coal bed is practically horizontal. The roof consists of a "draw-slate" 2 inches thick, which falls with the coal; above the "draw-slate" is a hard smooth shale. The floor is a hard smooth shale which does not become

mixed with the coal in mining. There is a streak of bony coal about 1 foot from the top of the bed, which is rather persistent throughout the mine. This is excluded in the sections given below.

The coal bed was measured and sampled at six points in the mine by E. B. Sutton and H. I. Smith, June 25, 1912, as described below:

Sections of coal bed in Rolfe mine.

Section.....	A	B	C	D	E	F
Laboratory No.....	14394	14395	14396	14397	14398	14400
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 3	1 4	1 4	1 2	1 1 $\frac{1}{2}$	1 2
Bone.....	a0 4	a0 3	a0 4	a0 2	a0 2 $\frac{1}{2}$	a0 2
Coal.....	1 1	1 1	1 1	1 1	1 2	1 0
Coal, gray.....	0 4	0 4	0 4	.. ..	.. ..	.. ..
Coal, gray, bony.....	.. ..	.. ..	.. ..	a0 4	a0 4	a0 4
Coal.....	2 3	2 1	2 1	2 3 $\frac{1}{2}$	2 3 $\frac{1}{2}$	2 2
Floor, shale.....	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	5 3	5 1	5 2	5 $\frac{1}{2}$	5 1 $\frac{1}{2}$	4 10
Thickness of coal sampled.....	4 11	4 10	4 10	4 6 $\frac{1}{2}$	4 7	4 4

a Not included in sample.

Section A (sample 14394) was measured at the face of B-2 butt entry off the B entry, 5,800 feet northwest of the mine mouth.

Section B (sample 14395) was measured at the face of B-1 butt entry off the B entry, 6,250 feet northwest of the mine mouth.

Section C (sample 14396) was measured at the face of the left boundary heading, 6,200 feet northwest of the mine mouth.

Section D (sample 14397) was measured at the face of room 15 off 3-A entry off right entry 1, 5,100 feet northeast of the mine mouth.

Section E (sample 14398) was measured at the face of room 18 off 2-A entry off right entry 2, 5,000 feet northeast of the mine mouth.

Section F (sample 14400) was measured on the pillar of room 4 off right entry 1, 4,200 feet east of the drift mouth.

A composite sample was made by mixing samples 14394 to 14398, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 14399.

Notes.—The Rolfe mine is opened by drift entries and the coal mined by the room-and-pillar system. At the time the mine was visited the coal was undercut by electric chain cutters and broken down with FFFF black powder. FFF black powder was used for brushing the roof. All of the coal was shipped as run-of-mine and pickers were employed on the cars in loading. The lumps were fairly large, ranging from 6 to 12 inch cubes. There were two loading tracks with a capacity for 22 empty and 45 loaded cars. There were no storage bins. Daily output, 700 tons with a maximum day's run of 875 tons. All of the coal was from advance workings.

SUSANA. YUKON-POCAHONTAS.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 14425, 14426, 14427, 14428, and 14429 (p. 118).

Mine.—Yukon-Pocahontas, Norfolk & Western district; a drift mine one-fourth mile west of Susana station (Yukon post office) on the Norfolk & Western Railway.

Coal bed.—War Creek. Carboniferous age, Pottsville formation. Average thickness, about 5 feet 3 inches. Dip, 1 $\frac{1}{2}$ per cent to the northwest. Roof, shale; floor, bony coal 15 inches to 30 inches thick, underlain with sandstone.

The coal bed was measured and sampled at five points in the mine by H. I. Smith and E. B. Sutton, June 28, 1912, as described below:

Sections of coal bed in Yukon-Pocahontas mine.

Section.....	A	B	C	D	E
Laboratory No.....	14425	14426	14427	14428	14429
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal and mother coal.....	a 0 1½	.. ..	.. ..	a 0 2	a 0 3½
Coal.....	.. ..	0 1	.. ..	.. ..	.. ..
Bone.....	.. ..	a 0 ½	.. ..	.. ..	.. ..
Coal.....	0 11½	0 9	1 1	.. ..	2 2
"Sulphur" band.....	Streak.	Streak.	Streak.	.. ..	0 ½
Coal.....	3 4	1 10½	2 7	4 1	1 9
Bone.....	a 1 4	a 1 3½	a 1 8½	a 0 10	a 1 0
Floor, sandstone.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	5 9	4 ½	5 4½	5 1	5 3
Thickness of coal sampled.....	4 3½	2 8½	3 8	4 1	3 11½

a Not included in sample.

Section A (sample 14425) was measured on a pillar of the third right cross-cut off the main entry, at the last break-through, 1,200 feet northwest of the old opening.

Section B (sample 14426) was measured at the face of room 24 off the main air course, 1,700 feet southwest of the main opening.

Section C (sample 14427) was measured at the face of the main entry, 1,850 feet southwest of the main opening.

Section D (sample 14428) was measured at the face of room 7 off the main air course, 850 feet southwest of the main opening.

Section E (sample 14429) was measured at the face of room 14 off the main air course, 1,100 feet southwest of the main opening.

A composite sample was made by mixing face samples 14426 to 14429, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 14430.

Notes.—The Yukon-Pocahontas mine is opened by drift entries and the coal mined by the room-and-pillar system. At the time the mine was visited all of the coal was mined by hand. FFF black blasting powder was used for breaking the coal. None of the coal was shipped as run-of-mine. The screening plant was equipped with screens for producing 4-inch, 1½-inch, and ¾-inch coal. Pickers were employed on the car in loading and also at a traveling belt. The coal lumps were large and had a good appearance. There were four loading tracks with a capacity for 40 empty and 35 loaded cars. The mine had a daily output of 400 tons, practically all of which was from advance workings. The maximum capacity of the mine was about 575 tons per day. There was about 4,000 acres of unmined coal tributary to this mine.

MAYBEURY. NORFOLK MINE.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 11247 and 11780 (p. 119).

Mine.—Norfolk, a drift mine 2 miles from Maybeury, on the Norfolk & Western Railway.

Coal bed.—Pocahontas No. 3. Carboniferous (Pennsylvanian) age, Pocahontas formation. The bed is about 8½ feet thick and lies nearly horizontal.

Two car samples of coal from this mine were taken by E. R. Linkenhoker as the cars were being unloaded at the Bureau of Mines testing station at Pittsburgh, on November 28, 1910, and March 2, 1911, respectively.

Samples 11247 and 11780 each represent a car load of ¾-inch to 1½-inch nut coal.

For analyses and descriptions of other samples of coal from this mine, see Bureau of Mines Bull. 22, 1913, pp. 265, 1001.

WAR. JOHN'S BRANCH MINE.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 14468, 14469, 14470, 14471, and 14472 (p. 119).

Mine.—John's Branch, Norfolk & Western district; a drift mine 1 mile south of War on the Dry Fork branch of the Norfolk & Western Railway.

Coal bed.—War Creek. Carboniferous age, Pottsville formation. Average thickness, 3 feet 10 inches. The coal bed is practically horizontal. Roof, 4 inches of "draw slate," which parts easily from the coal. Above the "draw slate" is a main cap rock. Floor, sandstone.

The coal bed was measured and sampled at four points in the mine by H. I. Smith and E. B. Sutton, June 29, 1912, as described below:

Sections of coal bed in John's Branch mine.

Section.....	A	B	C	D
Laboratory No.....	14468	14469	14470	14471
Roof, "draw slate".....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 3½	0 3½	.. ..	.. ..
Coal, gray.....	0 1	.. ..	.. ..	.. ..
Coal, bony.....	.. ..	0 ¾	.. ..	.. ..
Coal.....	1 6	3 6	3 8	3 7
Mother coal and "sulphur".....	0 ½	.. ..	.. ..	.. ..
Coal.....	0 10	.. ..	.. ..	.. ..
Coal, bony.....	a 0 7	.. ..	a 0 8	a 0 9
Floor, shale, coal, and sandstone.....	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 4	3 10	4 4	4 4
Thickness of coal sampled.....	2 9	3 10	3 8	3 7

a Not included in sample.

Section A (sample 14468) was measured at the face of the main entry, 800 feet from the mine mouth.

Section B (sample 14469) was measured at the face of heading 3 off the right entry.

Section C (sample 14470) was measured at the face of room 4 off the first left air course.

Section D (sample 14471) was measured at the face of the first right butt entry off left entry 2.

A composite sample was made by mixing face samples 14468 to 14471, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 14472.

Notes.—The John's Branch mine is opened by drift entries and the coal mined by the room-and-pillar system. At the time of sampling all the mining was done by hand and the coal broken with FFF black powder. All of the coal was shipped as run-of-mine. There was no screening plant. Pickers were employed on the car in loading. The lumps of coal were large and had a good appearance. The loading tracks had a capacity of 15 empty and 15 loaded cars. Daily output, 125 tons.

WAR. WAR CREEK MINE.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 14405, 14406, 14407, and 14408 (p. 119).

Mine.—War Creek, Norfolk & Western district; a drift mine at War, on the Dry Fork branch of the Norfolk & Western Railway.

Coal bed.—War Creek. Carboniferous age, Pottsville formation. Average thickness, 4 feet. Roof, smooth shale, 10 feet thick, which does not fall when the coal is mined. Floor, soft sandstone.

The coal bed was measured and sampled at three points in the mine by H. I. Smith and E. B. Sutton on June 30, 1912, as described below:

Sections of coal bed in War Creek mine.

Section.....	A	B	C
Laboratory No.....	14405	14406	14407
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bony.....	0 3½	0 2½	.. ..
Coal.....	.. ..	0 8	.. ..
Mother coal and "sulphur".....	.. ..	0 ½	.. ..
Coal.....	1 9½	1 1	.. ..
Mother coal and "sulphur".....	0 ½	0 ½	.. ..
Coal.....	1 1	1 3	3 0
Coal, bony.....	0 1½	0 7½	.. ..
Floor, sandstone.....	.. ..	.. ..	.. ..
Thickness of bed.....	3 4	3 11	3 0
Thickness of coal sampled.....	3 4	3 11	3 0

Section A (sample 14405) was measured at the face of the fourth left cross entry off the main entry.

Section B (sample 14406) was measured at the face of the main entry, 1,200 feet from the mine mouth.

Section C (sample 14407) was measured at the face of room 4 off the main air course, about 1,000 feet from the mine mouth.

A composite sample was made by mixing face samples 14405, 14406, and 14407. The results of an ultimate analysis of this sample are given under laboratory No. 14408.

Notes.—The War Creek mine is opened by drift entries and the coal mined by the room-and-pillar system. At the time of sampling the coal was undercut by hand and in some places was cut at the top of the bed. FFF black blasting powder was used both for breaking the coal and for brushing the roof. All of the coal was shipped as run-of-mine. Pickers were employed on the car in loading. The coal had a good appearance when loaded, the lumps being fairly large. There was one loading track with a capacity for a number of cars. Daily output, 50 tons. There was about 1,000 acres of land tributary to this mine. The War Creek mine is comparatively new.

WELCH. OREGON No. 2 AND No. 3 MINES.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 14212, 14213, 14214, 14215, 14216, and 14217 (p. 120).

Mine.—Oregon No. 2 and No. 3; Norfolk & Western district; drift mines, 2 miles west of Welch, Hemphill Township, with railroad connections to the Norfolk & Western Railway.

Coal bed.—Pocahontas No. 4. Carboniferous age, Pottsville formation. Average thickness, 3 feet 6 inches; the bed is practically horizontal. The roof is a dark, hard, smooth, sandy shale, and does not fall immediately after the coal is taken out. Floor, hard, smooth sandstone. Material from the roof and from the floor does not become mixed with the coal when mined. Cover, 150 to 450 feet.

The coal bed was measured and sampled at five points in the mines by G. H. Deike on June 30, 1912, as described below:

Sections of coal bed in Oregon No. 2 and No. 3 mines.

Section.....	A	B	C	D	E
Laboratory No.....	14212	14213	14214	14215	14216
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 11	1 0	1 0	0 10	1 0
Gray coal, hard.....	0 4	0 4	0 4	0 4	0 4
Coal.....	2 4	2 1	2 9	1 11	2 0
Floor, sandstone.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	3 7	3 5	4 1	3 1	3 4
Thickness of coal sampled.....	3 7	3 5	4 1	3 1	3 4

Section A (sample 14212) was measured at the face of main entry, 3,000 feet southwest of mouth of No. 3 mine.

Section B (sample 14213) was measured at the face of room 16 off fourth left entry, 2,000 feet south of mouth of No. 3 mine.

Section C (sample 14214) was measured on the pillar of room 1, off first left entry, 800 feet southeast of mouth of No. 3 mine.

Section D (sample 14215) was measured at the face of the main entry, 4,000 feet south of mouth of No. 2 mine.

Section E (sample 14216) was measured on the rib of room 11, off the air course, 100 feet from the face and 3,500 feet southeast of mouth of No. 2 mine.

A composite sample was made by mixing samples 14212 to 14216, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 14217.

Notes.—The Oregon mines are opened by drift and worked by the room-and-pillar system of mining. At the time of sampling, the coal was undercut by compressed air punchers and shot down with FFF black powder. Permissible explosives were used for brushing the roof. The tippie was equipped with a shaking screen 5 by 24 feet with 3-inch holes. Fifty per cent of the coal passed through the screens. About 50 per cent of the coal was shipped as run-of-mine. The coal had a good appearance when loaded on the cars. There were two loading tracks with a capacity of 25 empty and 20 loaded cars. There was about 1,800 acres of unmined land tributary to this mine. Forty per cent of the coal was taken out in advance workings. The capacity of the mines was 450 tons a day with a maximum day's run of about 800 tons.

WELCH. STANDARD POCAHONTAS MINE.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 12512 and 12513 (p. 120).

Mine.—Standard Pocahontas; Norfolk & Western district; the mine is opened by a shaft 370 feet deep and is 2 miles west of Welch on the Norfolk & Western Railway.

Coal bed.—Pocahontas No. 3 bed. Carboniferous age, Pocahontas formation. Thickness, 4 feet 7 inches to 6 feet. There is a characteristic bone parting 2 to 5 inches thick near the middle of the bed. Roof, "draw slate," overlain by 3 feet of black shale. Particles of the roof did not mix with the coal in loading. Floor, hard, smooth, sandy clay. Cover, about 375 feet.

The coal bed was measured and sampled at two points in the mine by J. T. Ryan on August 8, 1911, as described below:

Sections of coal bed in Standard Pocahontas mine.

Section.....	A		B	
	12512		12513	
Laboratory No.....	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, shale.....				
Coal laminated with mother coal.....	0	6½	0	3½
"Sulphur".....	0	½	..	..
Coal.....	0	9½	1	1½
Bone.....	a	0 4	a	0 2½
Coal.....	0	3½	..	..
Mother coal.....	0	1	..	..
Coal.....	2	10	3	4
Shale.....	0	2	..	..
Coal.....	0	1½	..	..
Floor, sandy clay.....				
Thickness of bed.....	5	3	4	11
Thickness of coal sampled.....	4	8¾	4	8½

a Not included in sample.

Section A (sample 12512) was measured at the face of the main entry in No. 2 shaft, 85 feet from the bottom of the shaft.

Section B (sample 12513) was measured at the face of entry driven from No. 1 shaft to connect with No. 2 shaft, about 120 feet from the bottom of No. 1 shaft.

Notes.—At the time of sampling the coal was undercut by puncher machines and blasted down with permissible explosives. The machine cuttings were loaded out with the coal. The entire future output of the mine will be from advanced work as this is a new development.

MARION COUNTY.

MONONGAH. MINE No. 63.

Sample.—Bituminous coal; analyses Nos. 11429, 11430, 11431, and 11432 (p. 121).

Mine.—No. 63 (formerly No. 8) Monongahela district; a slope mine at Monongah, on the main line of the Baltimore and Ohio Railroad.

Coal bed.—Pittsburgh. Carboniferous age, Monongahela formation; average thickness 7 feet; dip about 3° northwest; roof, dark shale 2 to 8 feet thick with sandstone cap rock; floor, fire clay; cover at points of sampling, 200 to 400 feet.

The bed was measured and sampled at four points in the mine by J. J. Rutledge on December 19, 1910, as described below:

Sections of coal bed in No. 63 mine, at Monongah.

Section.....	A	B	C	D
Laboratory No.....	11429	11430	11431	11432
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 0	1 11	1 7	1 10 $\frac{1}{2}$
“Sulphur” band.....	.. ..	0 $\frac{1}{2}$	a 0 $\frac{1}{2}$	0 $\frac{1}{4}$
Coal.....	.. ..	0 4 $\frac{1}{2}$	.. ..	0 4 $\frac{1}{2}$
Coal, bony.....	a 0	a 0 1	.. ..	a 0 1
Coal.....	0 3 $\frac{3}{4}$	0 4	.. ..	0 4
Coal, bony.....	a 0	a 0 $\frac{1}{4}$	.. ..	0 $\frac{1}{4}$
Coal.....	0 $\frac{1}{2}$	0 4	1 5	0 4
Coal, bony.....	a 0 1	a 0 1	a 0 1 $\frac{1}{2}$	a 0 1
Coal.....	2 3	2 10	3 10	2 10
“Sulphur” band.....	a 0 $\frac{1}{2}$	a 0 $\frac{1}{2}$	.. ..	0 $\frac{1}{2}$
Coal.....	0 6	.. ..	.. ..	1 5 $\frac{1}{4}$
“Sulphur” band.....	0 $\frac{1}{2}$	.. ..	.. ..	.. ..
Coal.....	1 6	1 7 $\frac{1}{4}$	.. ..	.. ..
Floor, clay.....				
Thickness of bed.....	7 3 $\frac{3}{4}$	7 7 $\frac{1}{4}$	7 0	7 5 $\frac{1}{2}$
Thickness of coal sampled.....	6 9 $\frac{1}{2}$	7 5	6 10	7 3 $\frac{1}{2}$

a Not included in sample.

Section A (sample 11429) was measured at the face of room 14, off left entry 3 off north entry 2, about 2,700 feet northwest of the mouth of the main slope.

Section B (sample 11430) was measured at the face of room 14 off left entry 4 off north entry 2, about 3,200 feet northwest of the mouth of the main slope.

Section C (sample 11431) was measured at the face of room 18 off left entry 2 off north entry 2, about 2,650 feet from the mouth of the main slope.

Section D (sample 11432) was measured at the face of room 30 off left entry 1, off north entry 2, about 2,900 feet northwest from the mouth of the main slope.

A composite sample was made by mixing face samples 11429 to 11432, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 11433.

Notes.—Coal hard and blocky and used largely for firing locomotives, by-products and lake shipments; some coke was made from the screenings at the mine. There were three loading tracks with capacity for 60 to 75 cars. The coal was mined by the room-and-pillar system with modified panel system; permissible explosives were used exclusively; the coal was undercut with electric chain machines; daily output, 800 to 1,000 tons.

MONTANA STATION. PARKER RUN MINE.

Sample.—Bituminous coal; analyses Nos. 15067, 15068, 15069, 15070, 15071, and 15072 (p. 121).

Mine.—Parker Run; Monongahela district; a drift mine one-fourth of a mile north of Montana station on the Baltimore & Ohio Railroad.

Coal bed.—Known as the Sewickley. Carboniferous age, Monongahela formation. Thickness, 5 feet 6 inches to 6 feet; average, 5 feet 9 inches. The character of the seam is fairly regular, though there are some sulphur balls and occasional clay binders. Roof, smooth sandstone; floor, soft fire clay; particles of the roof and floor sometimes become mixed with the coal in loading.

The bed was measured and sampled at five points in the mine by G. H. Deike and Edwin Higgins on November 9, 1912, as described below:

Sections of coal bed in Parker Run mine.

Section.....	A	B	C	D	E
Laboratory No.....	15067	15068	15069	15070	15071
Roof, sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Black shale.....	a 0 1	.. ..	.. ..	.. ..	.. ..
Coal, streaked, bony.....	a 0 1½	.. ..	.. ..	.. ..	a 0 1½
Coal, hard, bright.....	1 0	2 1	3 10½	3 5	3 9½
"Sulphur" streak.....	a 0 1½	a 0 1	a 0 1	a 0 2	.. ..
Coal, hard, bright.....	2 5	1 8	2 ½	1 9	.. ..
Coal streaked with bone.....	.. ..	a 0 ½	.. ..	.. ..	a 0 2½
"Sulphur" streak.....	a 0 1	.. ..	.. ..	.. ..	.. ..
Coal, hard, bright.....	2 0	2 2½	.. ..	.. ..	2 0
Coal, dirty, streaked.....	.. ..	.. ..	.. ..	.. ..	0 2
Bony coal and black "rash".....	a 0 1½	a 0 1	a 0 1	a 0 1	a 0 1
Floor, fire clay.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	5 11½	6 2	6 1	5 5	6 3½
Thickness of coal sampled.....	5 5	5 11½	5 11	5 2	5 11½

a Not included in sample.

Section A (sample 15067) was cut from a pillar on the main entry at the mouth of right entry 7, 2,400 feet northeast of the mine mouth.

Section B (sample 15068) was measured at the face of room 8 off right entry 5.

Section C (sample 15069) was measured at the face of room 21 off right entry 3.

Section D (sample 15070) was cut from a pillar on the main air course at the mouth of left entry 2.

Section E (sample 15071) was measured at the face of the fourth left air course, 1,800 feet northeast of the mine mouth.

A composite sample was made by mixing the face samples 15068, 15069, and 15071. The results of an ultimate analysis of this sample are given under laboratory No. 15072.

Notes.—At the time of sampling the coal was undercut by hand and compressed air punchers and shot down with FFF black powder. Black powder was also used for brushing the roof and floor. All the coal was shipped as run-of-mine. Average daily output, 450 tons. Practically all of the coal was derived from advance workings. There was approximately 1,500 acres of unmined coal tributary to this opening. Probable life of mine, about 25 years.

WORTHINGTON. HUTCHINSON MINE.

Sample.—Bituminous coal; analyses Nos. 11152, 11153, 11154, and 11155 (p. 121).

Mine.—Hutchinson; Monongahela district; a slope mine 1 mile from Worthington, on the Baltimore & Ohio Railroad.

Coal bed.—Pittsburgh. Carboniferous age, Monongahela formation. Average thickness, 102 inches; dip, 1½° northwest; roof, firm, smooth, dark shale; floor, hard, smooth fire clay. There is a workable coal bed 120 feet above this bed.

The bed was measured and sampled at four points in the Hutchinson mine by A. A. Straub, on November 5, 1910, as described below:

Sections of coal bed in Hutchinson mine.

Section.....	A	B	C	D
Laboratory No.....	11152	11153	11154	11155
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 10¾	2 8	3	2 8
Coal, bony.....	0	0	0	0
Coal.....	0 3½	0 5¼	0 2	0 3½
Coal, bony.....	0	0 1¼	0	0
Coal.....	0 3	0 11	0	0 3
Coal, bony.....	0	0 2½	0	0
Coal.....	4 5¼	4 2	1 6	4 2
"Sulphur" band.....	.. ..	.. ..	a 0	.. ..
Coal.....	.. ..	.. ..	1 0	.. ..
"Sulphur" band.....	.. ..	.. ..	a 0	.. ..
Coal.....	.. ..	.. ..	1 7½	.. ..
Floor, clay.....	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	8 ½	7 7¼	8 3¾	7 7¼
Thickness of coal sampled.....	8 5	7 7¼	8 3¾	7 7¼

a Not included in sample.

Section A (sample 11152) was measured on pillar 15 on left heading 3, 2,500 feet south from the mouth of the main slope.

Section B (sample 11153) was measured on pillar 20 on left heading 1, 1,500 feet south of the mouth of the main slope.

Section C (sample 11154) was measured at the face of room 8 off the fourth left butt entry, 3,000 feet south of the mouth of the main slope.

Section D (sample 11155) was measured at the face of room 10 off left heading 2, 1,000 feet south of the mouth of the main slope.

A composite sample was made by mixing samples 11152 to 11155, inclusive. The result of an ultimate analysis of this sample is given under laboratory No. 11156.

Notes.—The coal was mined by the room-and-pillar system. At the time of sampling black powder was used for breaking down the coal after undercutting by electric chain cutters; permissible explosives were used for brushing the roof. None of the coal was shipped as run-of-mine; coal was screened over $1\frac{1}{2}$ and $\frac{3}{4}$ -inch bar screens; pickers were employed on the cars when loading; there were three loading tracks with capacity for 32 cars. Daily output of mine, 400 tons. About 60 per cent of the coal produced was from advance work. Recovery, 90 per cent when pillars are pulled. There was 151 acres of coal tributary to the main slope.

MARSHALL COUNTY.

MOUNDSVILLE. PANAMA MINE.

Sample.—Bituminous coal; analyses Nos. 14486, 14487, and 14488 (p. 122).

Mine.—Panama; Wheeling district; a shaft mine 1 mile south of Moundsville station, on the Baltimore & Ohio Railroad.

Coal bed.—Pittsburgh. Carboniferous age, Monongahela formation. Average thickness, 5 feet 6 inches. There is a distinct cleat extending north and south. Occasional clay veins are encountered. The immediate roof consists of a "draw slate" over which is a roof coal and shale with a limestone cap rock. Floor, underclay and limestone. Small amounts of the shale from the roof and underclay occasionally mix with the coal in mining. Cover at points of sampling, 400 feet.

The coal bed was measured and sampled at two points in the mine by G. H. Deike and J. T. Ryan on July 20, 1912, as described below:

Sections of coal bed in Panama mine.

Section.....	A	B
Laboratory No.....	14486	14487
Roof, "draw slate", roof coal, and limestone.	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, bony.....	0	3
Coal.....	0 $\frac{7}{8}$	0 $\frac{5}{8}$
Mother coal.....	0 $\frac{1}{8}$	0 $\frac{1}{8}$
Coal.....	0 $\frac{1}{8}$	0 $\frac{1}{8}$
Mother coal.....	0 $\frac{1}{8}$	0 $\frac{1}{8}$
Coal.....	1 $\frac{1}{8}$	0 $\frac{1}{8}$
Shale, black.....	.. ..	a 0 $\frac{1}{8}$
Coal.....	.. ..	0 $\frac{5}{8}$
Coal, bony.....	.. ..	0 $\frac{1}{8}$
Mother coal or "sulphur".....	a 0 $\frac{1}{8}$	0 $\frac{1}{8}$
Coal.....	2 0	0 9
Coal with streaks of mother coal and "sulphur".....	0 4	0 $\frac{7}{8}$
"Sulphur" band.....	.. ..	a 0 $\frac{1}{8}$
Coal streaked with bony coal.....	0 $\frac{7}{8}$	0 8
Floor, underclay and limestone.		
Thickness of bed.....	4 $\frac{9}{16}$	4 $\frac{7}{8}$
Thickness of coal sampled.....	4 $\frac{8}{16}$	4 $\frac{5}{8}$

a Not included in sample.

Section A (sample 14486) was measured at the face of the second south air course, 2,050 feet southeast of the shaft.

Section B (sample 14487) was measured at the face of room 3 off right entry 2 off north entry 2, at a point 1,700 feet northeast of the shaft.

A composite sample was made by combining samples 14486 and 14487. The results of an ultimate analysis of this sample are given under laboratory No. 14488.

Notes.—The Panama mine is opened by a shaft 138 feet deep. The coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut with electric coal cutting machines and broken down with black powder. The machine cuttings were loaded out with the coal. About 35 per cent of the coal passed through the screens. The screening plant consisted of bars 12 feet long with $1\frac{1}{4}$ and $\frac{3}{4}$ inch openings. No pickers were employed on the cars or belt. The lumps were small. There were two loading tracks with a capacity of 15 loaded cars. Approximately 3,000 acres remained to be mined. The probable lifetime of the mine was 30 years. The maximum day's run was 650 tons. Average daily output, 450 tons.

MERCER COUNTY.

CRYSTAL. GODFREY MINE.

Sample.—Semibituminous coal; Norfolk & Western field; analyses Nos. 14258, 14259, and 14261 (p. 122).

Mine.—Godfrey, Pocahontas district, a drift mine $\frac{1}{2}$ mile southeast of Crystal on the Wenonah branch of the Norfolk & Western Railway.

Coal bed.—Pocahontas No. 3. Carboniferous age, Pottsville formation. Average thickness, 4 feet 6 inches; dip, $1\frac{1}{2}$ per cent northwest. Roof, smooth gray shale; floor, hard fire clay. Material from the roof and floor does not become mixed with the coal in mining. Cover, 150 to 200 feet.

The coal bed was measured and sampled at three points in the mine by D. J. Price, July 2, 1912, as described below:

Sections of coal bed in Godfrey mine.

Section.....	A	B	C
Laboratory No.	14258	14259	14261
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 3	1 10	1 2
"Sulphur" band.....	a 0 1	.. ..	a 0 1
Coal.....	0 5	.. ..	0 6
Bone.....	a 0 4	a 0 3	a 0 3
Coal.....	1 11	2 2	2 7
Floor, fire clay.			
Thickness of bed.....	4 0	4 3	4 7
Thickness of coal sampled.....	3 7	4 0	4 3

a Not included in sample.

Section A (sample 14258) was measured on the pillar of right entry 2, 1,100 feet northeast of the mine mouth.

Section B (sample 14259) was measured in room 3, left heading 2, off the old main entry, 700 feet southeast of the mine mouth.

Section C (sample 14261) was measured at the face of room 4, next to "Crystal."

A composite sample was made by mixing samples 14258 and 14259. The results of an ultimate analysis of this sample are given under laboratory No. 14260.

Notes.—The Godfrey mine is opened by drift entry and the coal mined by the room-and-pillar system.

At the time the mine was visited the coal was undercut by hand and shot down with FFF black powder. About 20 per cent of the coal mined was from advance workings and the remainder was from pillars. All of the coal was shipped as run-of-mine and pickers were employed on the cars in loading. The tippie was about 5,000 feet from the mouth of the mine. The distance from the foot of the incline to the tippie was about 2,000 feet. The loading track had a capacity for 14 empty and 17 loaded cars. Daily production, 100 tons. There was approximately 40 acres of unmined coal tributary to this entry.

GOODWILL. GOODWILL MINE.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 14163, 14164, 14165, 14166, and 14167 (p. 123).

Mine.—Goodwill; Norfolk and Western district; a drift mine in Goodwill township, $\frac{1}{2}$ mile northeast of Goodwill on a branch of the Norfolk & Western Railway.

Coal bed.—Pocahontas No. 3. Carboniferous age, Pottsville formation. Average thickness 4 feet 8 inches; dip, 2 per cent northwest. Rolls occur in the bottom of the coal, but no faults or horsebacks are encountered. The roof is a "draw slate" 8 inches thick, overlain with sandstone; the floor is a smooth shale about 15 inches thick, below which there is a small amount of coal and sandstone. Particles of the roof do not mix with the coal, although a small amount of the shale bottom becomes mixed with the coal in mining. Cover at points of sampling, 300 to 400 feet.

The coal bed was measured and sampled at four points in the mine by D. J. Price on June 24 and 25, 1912, as described below:

Sections of coal bed in Goodwill mine.

Section.....	A	B	C	D
Laboratory No.....	14163	14164	14165	14166
Roof, sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 1	1 1 $\frac{1}{2}$	1 4	1 3
Bone and "sulphur".....	a 0 5	a 0 5	a 0 5	a 0 4 $\frac{1}{2}$
Coal.....	3 3	3 2 $\frac{1}{2}$	2 9	2 10
Floor, shale.....				
Thickness of bed.....	4 9	4 9	4 6	4 5 $\frac{1}{2}$
Thickness of coal sampled.....	4 4	4 4	4 1	4 1

a Not included in sample.

Section A (sample 14163) was measured at the face of room 16, eighth left cross entry, 3,700 feet north of drift mouth No. 3.

Section B (sample 14164) was measured at the face of room 3, off second crosscut off Smith's entry, 3,000 feet northeast of drift mouth No. 3.

Section C (sample 14165) was measured at the face of the first crosscut off Nichol's entry, 2,850 feet east of drift mouth No. 2.

Section D (sample 14166) was measured on a pillar, 2,400 feet east of drift mouth No. 2.

A composite sample was made by combining pillar sample 14166 and face samples 14163, 14164, and 14165. The ultimate analysis of this sample is represented by laboratory No. 14167.

Notes.—The Goodwill mine is opened by 3 drift entries 2,388 feet above sea level. The coal is mined by the room-and-pillar method. At the time of sampling the coal was undercut by hand and electric short wall machines. The undercuttings were loaded out with the coal. The coal was broken down with FFF black blasting powder and a permissible powder was used for brushing the floor and roof. Although all the coal was shipped as run-of-mine, the tippie was equipped with screens as follows: Bars 8 by 12 feet with 3-inch openings, and 8 by 12 feet with $\frac{5}{8}$ -inch openings. Pickers were employed on the cars in loading. The screens were not washed or coked. The loading track had a capacity for 12 empty and 15 loaded cars. The mine was being run at its capacity, 350 tons per day. About 50 per cent of the coal came from advance workings and 50 per cent from pillars. There was about 400 acres of coal to be taken out from the three openings.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, Bureau of Mines, 1913, pp. 1023-1024.

GOODWILL. LOUISVILLE NO. 1, NO. 2, AND NO. 3 MINES.

Samples.—Semibituminous coal; Pocahontas field; analyses Nos. 14191, 14192, 14193, 14194, 14195, 14196, 14206, and 14207 (p. 123).

Mines.—Louisville Nos. 1, 2, and 3; Norfolk & Western district; drift mines in Goodwill township. Mines 1 and 2 are $\frac{1}{2}$ mile northwest and No. 3 is 1 mile northwest of Goodwill station on the Flipping Creek Branch of the Norfolk & Western Railway.

Coal bed.—Pocahontas No. 3. Carboniferous age, Pottsville formation. Average thickness, 4 feet 8 inches, dip 2 per cent northwest. The roof is a "draw slate" which is smooth and does not become mixed with the coal in mining. The "draw slate" is 8 inches to 4 feet thick, above which is a sandstone cap rock. The floor is a smooth, fairly hard shale in which are thin streaks of coal. Cover at points of sampling, 200 to 400 feet.

The coal bed was measured and sampled at one point in No. 1 mine, at four points in No. 2 mine, and at two points in No. 3 mine by G. H. Deike on June 24, 1912, as described below:

Sections of coal bed in Louisville No. 1, No. 2, and No. 3 mines.

Section.....	A	B	C	D	E	F	G
Laboratory No.....	14191	14192	14193	14194	14195	14206	14207
Roof, sandstone.....							
Coal, streaked with mother coal.....	<i>Ft. in.</i> 1 1	<i>Ft. in.</i> 1 1 $\frac{1}{2}$	<i>Ft. in.</i> 1 1 $\frac{1}{2}$	<i>Ft. in.</i> 1 2 $\frac{1}{2}$	<i>Ft. in.</i> 1 2	<i>Ft. in.</i> 1 1 $\frac{1}{2}$	<i>Ft. in.</i> 1 0
"Sulphur" band.....	<i>a</i> 0 $\frac{1}{2}$	<i>a</i> 0 $\frac{1}{2}$	<i>a</i> 0 $\frac{1}{2}$	<i>a</i> 0 ..	<i>a</i> 0 $\frac{3}{4}$	<i>a</i> 0 $\frac{1}{2}$	.. ..
Coal.....	.. ..	<i>a</i> 0 3 $\frac{1}{2}$	<i>a</i> 0 3	<i>a</i> 0 2 $\frac{1}{2}$	<i>a</i> 0 3	<i>a</i> 0 3	.. ..
Coal, bony.....	<i>a</i> 0 4 $\frac{1}{2}$	.. ..	.. ..	.. ..	.. ..	.. ..	<i>a</i> 0 5
Coal.....	.. ..	1 4	0 5	1 0	0 8	2 6	.. ..
Coal, gray.....	.. ..	0 $\frac{1}{2}$	0 $\frac{1}{2}$	0 $\frac{1}{2}$	0 $\frac{1}{4}$	0 $\frac{1}{2}$	.. ..
Coal.....	.. ..	0 6	.. ..	.. ..	0 11	.. ..	.. ..
Coal, gray.....	.. ..	0 $\frac{1}{2}$	.. ..	.. ..	0	.. ..	.. ..
Coal.....	3 2	1 2	2 $\frac{1}{2}$	2 2 $\frac{1}{2}$	1 11 $\frac{1}{4}$	0 9	3 5
Floor, shale.....							
Thickness of bed.....	4 8	4 6 $\frac{1}{2}$	4 6 $\frac{1}{2}$	4 8	5 1	4 9	4 10
Thickness of coal sampled..	4 3	4 2 $\frac{1}{2}$	4 2 $\frac{1}{2}$	4 5 $\frac{1}{2}$	4 9	4 5	4 5

a Not included in sample.

Section A (sample 14191) was measured at the face of the main entry, 5,400 feet northeast of mouth of No. 2 mine.

Section B (sample 14192) was measured at the face of room 19, off left heading 9, 5,700 feet northeast of mouth of No. 2 mine.

Section C (sample 14193) was measured on the rib of room 14, off left heading 6, 4,500 feet northeast of mouth of No. 2 mine.

Section D (sample 14194) was measured on the rib of room 13, off left heading 4, 3,000 feet northeast of mouth of No. 2 mine.

Section E (sample 14195) was measured on the barrier pillar between the second left air course and second left pillar, 1,500 feet northwest of mouth of No. 3 mine.

Section F (sample 14206) was measured at the face, 1,950 feet northeast of mouth of No. 3 mine.

Section G (sample 14207) was measured on the pillar of main entry, 900 feet northeast of mouth of No. 1 mine.

A composite sample was made by mixing samples 14191, 14192, 14193, 14194, 14195, 14206, and 14207. The results of an ultimate analysis of this sample are shown under laboratory No. 14196.

Notes.—The mines are opened by drifts and the coal is mined by the room-and-pillar system. At the time the mine was visited electric coal cutters were used for undercutting the coal; FFF black powder was used for breaking down the coal and a permissible explosive for brushing the roof. About 20 per cent of the coal was shipped as run-of-mine and 25 per cent as slack. The screening plant had one shaking screen with 5-inch openings and one bar screen with 3-inch openings. The smaller coal

was run over a bar screen with openings of 1 inch to 1½ inches. Pickers were employed on the cars in loading. The washery had a daily capacity of 1,200 tons. The screenings were coked. The coking plant had a capacity of 125 tons per day. There were two loading tracks with a capacity for 50 empty cars and 20 loaded cars. The storage bins had a capacity for 150 tons. The coal when loaded on the cars had a good appearance and the lumps were large. There was approximately 400 acres of unmined coal tributary to these openings. About 40 per cent of the coal mined was from the advance workings. Daily output, 1,000 tons.

MATOAKA. PAWAMA NO. 1 AND NO. 2 MINES.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 14231, 14232, 14233, 14234, 14235, 14236, and 14237 (p. 123).

Mine.—Pawama No. 1 and No. 2; Norfolk & Western district; drift mines at Matoaka, on the Norfolk & Western Railway and near the Virginia Railway.

Coal bed.—Pocahontas No. 3. Carboniferous age, Pottsville formation. Average thickness, 4 feet 4 inches; dip, 1½° northwest. There are no faults, rolls, or horsebacks. There is a characteristic bone parting about 3 inches thick near the middle of the bed. The roof consists of 12 inches of "draw slate," which was shot down after loading out the coal. Floor, soft smooth underclay. Cover at points of sampling, 150 to 175 feet.

The coal bed was measured and sampled at five points in the mines by J. J. Rutledge and D. J. Price on July 1, 1912, as described below:

Sections of coal bed in Pawama No. 1 and No. 2 mines.

Section.....	No. 2 mine.			No. 1 mine.	
	A 14231	B 14232	C 14233	D 14235	E 14236
Laboratory No.					
Roof, gray shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 0	1 0	0 10	0 10½	1 0
"Sulphur" and bone.....	a 0 ¼	a 0 ¼	a 0 1	a 0 3	a 0 2
Coal.....	0 7	0 8½	0 7	0 9	0 9½
Bone.....	a 0 2½	a 0 2½	a 0 4½	a 0 4	a 0 3
Coal.....	2 7	2 4½	2 7	2 5	2 2
Floor, underclay.....					
Thickness of bed.....	4 4¾	4 3¾	4 5½	4 7½	4 5
Thickness of coal sampled.....	4 2	4 1	4 0	4 ½	3 11½

a Not included in sample.

Section A (sample 14231) was measured at the face of the Roanoke heading, 2,060 feet southwest of the drift mouth of No. 2 mine.

Section B (sample 14232) was measured at the face of the main entry, 2,600 feet southwest of the drift mouth of No. 2 mine.

Section C (sample 14233) was measured at the face of room 20, off Norfolk entry, 2,300 feet southwest of the drift mouth of No. 2 mine.

A composite sample was made by combining and mixing samples 14231, 14232, and 14233. The results of an ultimate analysis of this sample are given under laboratory No. 14234.

Section D (sample 14235) was measured on pillar of room 14, off Walker heading, 1,000 feet north of the drift mouth of No. 1 mine.

Section E (sample 14236) was measured on pillar on Godfrey heading, 1,520 feet southwest of the drift mouth of No. 1 mine.

A composite sample was made by mixing pillar samples 14235 and 14236. The results of an ultimate analysis of this sample are given under laboratory No. 14237.

Notes.—The Pawama mines are opened by a drift about 2,600 feet above sea level and are worked by the room-and-pillar system. At the time of sampling the coal was undercut by hand and broken down with FFF black blasting powder. About 80

per cent of the coal was shipped as run-of-mine. The remainder was passed over bar screens 12 feet long with 4-inch openings. Pickers and trimmers were employed on the cars. There were two loading tracks with a capacity of 18 empty cars and 14 loaded cars. Daily output, 450 tons, with a maximum day's run of 700 tons.

MORA. CRANE CREEK NO. 1 AND NO. 2 MINES.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. W32517, W32518, W32519, W32520, W32600, W32601, W32602, and W32603 (pp. 124, 125).

Mine.—Crane Creek No. 1 and No. 2, Norfolk & Western district, slope mines, $\frac{1}{2}$ mile west of Mora on the Pocahontas division of the Norfolk & Western Railway.

Coal bed.—Known as Pocahontas No. 3. Carboniferous (Pottsville) age, Pocahontas formation. Thickness, 4 feet to 6 feet 6 inches. Roof, sandstone and shale; floor, shale. A "rash" 1 to 4 inches thick overlies the coal; this is removed from all run-of-mine coal at the tippie by passing the coal over 3-inch screens. The coal from this bed is of very good quality, and can easily be cleaned from partings.

The coal bed was measured and sampled at eight points in the mine on July 19 and 20, 1912, by P. M. Riefkin, as described below:

Sections of coal bed in Crane Creek No. 1 mine.

Section.....	A	B	C	D
Laboratory No.....	W32517	W32518	W32519	W32520
Roof, sandstone and shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, hard, gray.....	0 9 $\frac{1}{2}$	0 9	0 4	0 10
Coal.....	0 2 $\frac{1}{2}$	0 2	0 7 $\frac{1}{2}$	0 10
Bony coal to "sulphur".....	0 6	0 7	0 11 $\frac{1}{2}$	0 3 5 $\frac{1}{2}$
Coal.....	0 2 $\frac{1}{2}$	0 3 $\frac{1}{2}$	0 4	0 4
Coal, hard, gray.....	2 5 $\frac{1}{2}$	2 5	0 8	0 8
Mother coal.....	0 2	0 2 $\frac{1}{2}$	0 4	0 4
Shale.....	0 2	0 3 $\frac{1}{2}$	0 4	0 4
Mother coal.....	0 2	0 3 $\frac{1}{2}$	0 4	0 4
Coal.....	0 24	0 3 $\frac{1}{2}$	1 11 $\frac{1}{2}$	0 8
Bony coal to shale.....	0 14	0 8	0 8	0 8
Coal.....	4 11	4 9	5 7 $\frac{1}{2}$	4 5
Floor, shale.	4 6 $\frac{1}{2}$	4 4 $\frac{1}{2}$	5 3	4 3 $\frac{1}{2}$
Thickness of bed.....				
Thickness of coal sampled.....				

a Not included in sample.

Section A (sample W32517) was measured at the face of the main heading.

Section B (sample W32518) was measured at the face of eighteenth cross air course.

Section C (sample W32519) was measured on the pillar beyond the second cut-through in room 11 off cross entry 16.

Section D (sample W32520) was measured on the pillar beyond the second cut-through in room 21 off cross entry 6, off the main heading.

Sections of coal bed in Crane Creek No. 2 mine.

Section.....	A	B	C	D
Laboratory No.....	W32600	W32601	W32602	W32603
Roof, sandstone and shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Muck.....	a 0 2	0 10 $\frac{1}{2}$	0 9 $\frac{1}{2}$	a 0 2
Coal.....	0 5 $\frac{1}{2}$	0 10 $\frac{1}{2}$	0 9 $\frac{1}{2}$	0 8
Mother coal (hard).....	0 4	0 10 $\frac{1}{2}$	0 9 $\frac{1}{2}$	0 14
Coal.....	0 5	0 10 $\frac{1}{2}$	0 9 $\frac{1}{2}$	0 14
Coal, bony.....	a 0 1	a 0 3	a 0 13	a 0 3
Coal.....	0 1	2 0	0 6 $\frac{1}{2}$	0 7
Coal, hard, gray.....	3 6	1 2	2 7 $\frac{1}{2}$	1 8 $\frac{1}{2}$
Coal.....	a 0 1	a 0 2	Streak.	0 1
Mother coal, hard, to shale.....	0 1	0 1	0 1	0 1
Coal.....	0 2	0 2	0 2	0 2
Mother coal, hard, bony.....	0 4	0 5 $\frac{1}{2}$	0 5 $\frac{1}{2}$	0 8 $\frac{1}{2}$
Coal.....	5 4	5 3	5 4	4 8 $\frac{1}{2}$
Floor, fire clay and shale.	4 4 $\frac{1}{2}$	4 10	4 9	4 1
Thickness of bed.....				
Thickness of coal sampled.....				

a Not included in sample.

Section A (sample W32600) was measured in a pocket above the second cut-through in room 4, off cross entry 3.

Section B (sample W32601) was measured at the face of room 14, off Allegheny entry.

Section C (sample W32602) was measured on a chain pillar between rooms 21 and 22, off Blue Ridge entry.

Section D (sample W32603) was measured at the face of room 13, off Bryant entry.

Notes.—The Crane Creek No. 1 and No. 2 mines dumped coal over the same tippie. At the time of sampling the coal in these mines was undercut by hand with picks in the bottom part of the seam, and shot down with black powder. The tippie was constructed of wood and steel, and equipped with a 3-inch bar screen, a 2-inch, 1½-inch, 1-inch and ¾-inch revolving screen, and a picking table. The inspection and preparation of this coal was exceptionally good; all coal passing over the 4-inch screen was shipped as run-of-mine coal, and passed over a picking table before going into the railroad cars. The commercial sizes as shipped, besides run-of-mine, were egg and stoker coal. All of the coal which passed through the ¾-inch mesh of the revolving screen was washed. The washed coal was not shipped, but was coked.

The average output of the two mines was 1,000 tons per day, with a daily capacity of 1,750 tons. The unmined area was about 3,800 acres.

For analyses and descriptions of other samples of coal from this mine, see Bull. 22, Bureau of Mines, 1913, pp. 1026–1027.

MORA. PINNACLE MINE.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. W32604, W32605, W32606, W32607, W32608, and W32609 (p. 125).

Mine.—Pinnacle; Norfolk & Western district; a slope mine; 1 mile north of Mora on the Pocahontas division of the Norfolk & Western Railway.

Coal bed.—Known as Pocahontas No. 3. Carboniferous (Pottsville) age, Pocahontas, formation. The coal in this mine is 4 to 5 feet 6 inches thick. Roof and floor goods a "trash" 1 to 4 inches thick overlies the coal; this is eliminated from run-of-mine coal at the tippie by bar screens. The coal from this bed is of a good quality and can easily be cleaned.

The coal bed was measured and sampled at six points in the mine by P. M. Riefkin on July 21, 1912, as described below:

Sections of coal bed in Pinnacle mine.

Section	A		B		C		D		E		F	
Laboratory No.	W32604		W32605		W32606		W32607		W32608		W32609	
Roof, shale and sandstone.	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Muck and "draw slate"	a0	1	a0	1½	a0	2½	a0	3	a0	1½	a0	1
Coal, gray									0	6½		
Coal	1	2½	0	11½	1	0	0	10	0	5	0	11
Mother coal				0		½	0	½			0	½
"Sulphur"									a0	¾	a0	1½
Coal, bony	a0	2			a0	3						
Coal	1	6¼	0	1½	3	3	0	5½	0	5½	0	2
Mother coal, hard, bony			0	½								
Coal			0	2								
Coal, bony	0	½	a0	3			a0	2¾	a0	2	a0	2½
Coal	1	2½	2	8½			3	0	2	11	3	4½
Mother coal			0	½								
Floor, shale.												
Thickness of bed	4	2¾	4	4½	4	8½	4	9¾	4	8½	4	11
Thickness of coal sampled	3	11¾	4	0	4	3	4	4	4	4	4	6

a Not included in sample.

Section A (sample W32604) was measured at the face of cross entry 2, north mine.

Section B (sample W32605) was measured at the face of the north main heading.

Section C (sample W32606) was measured at face of a pocket in the first pillar of room 25, cross entry 2, off main heading.

Section D (sample W32607) was measured at the face of cut-through off Cuba entry, off the second main heading.

Section E (sample W32608) was measured at the face of main heading 2.

Section F (sample W32609) was measured on a pillar of room 16, off cross entry 4, off the first main heading.

Notes.—At the time of sampling the coal in this mine was undercut in the bottom part of the seam by hand with picks, and shot down with black powder. The tippie was constructed of wood and equipped with a 3-inch bar screen and a 2-inch, 1½-inch, 1-inch, and ¾-inch revolving screen, washer, and picking table. The inspection and preparation of the coal for the market was exceptionally good. The coal was picked on a picking table and on the cars after passing over the 4-inch bar screen. The coal that passed through the 4-inch screen fell into the revolving screen, and the screened coal was shipped as egg and stoker coal. All the coal that passed through the ¾-inch mesh revolving screen was washed. Very little of the washed coal was shipped, practically all of it being coked. Average daily output, 1,000 tons, with a capacity of 1,600 tons per day. The unmined area was about 1,700 acres.

For analyses and descriptions of other samples of coal from this mine see Bulletin 22, Bureau of Mines, 1913, pages 1027-1028.

MORA. SAGAMORE NO. 1 AND NO. 2 MINES.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 14250, 14251, 14252, 14253, 14254, 14255, 14256, and 14257 (p. 125).

Mine.—Sagamore No. 1 and No. 2; Norfolk and Western district; drift mines 1 mile west and 1 mile east of Mora, respectively, both on the Crane Creek branch of the Norfolk & Western Railway.

Coal bed.—Pocahontas No. 3. Carboniferous (Pottsville) age, Pocahontas formation. Average thickness of bed in No. 1 mine about 5 feet, in No. 2 mine about 4 feet 6 inches. Roof, smooth, dark, soft, sandy shale, 10 to 24 inches thick. Floor, light-gray shale, smooth, and fairly hard. Occasionally a small amount of the roof material becomes mixed with the coal, but none of the floor is broken loose during mining operations. Cover at points of sampling, 250 to 400 feet.

The coal bed was measured and sampled at three points in No. 1 mine and at four points in No. 2 mine by H. I. Smith and G. H. Deike, July 2, 1912, as described below:

Sections of coal bed in Sagamore No. 1 mine.

Section.....	A 14250		B 14251		C 14252	
Laboratory No.....	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, sandy shale.....						
Coal.....	0	9	0	9	0	10
Coal, bony.....	a	0 4	a	0 3½	a	0 6
Coal.....	..	..	0	9	0	9
Coal, gray.....	..	..	0	1½	0	1½
Coal.....	..	..	0	6	..	..
Coal, gray.....	..	..	0	½	..	..
Coal.....	3	2	2	1	2	0
Mother coal.....	..	..	..	..	0	½
Coal.....	..	..	..	..	0	6
"Rash".....	a	0 9	a	0 6	a	0 6
Coal (streaked).....	..	..	0	6	0	8
Floor, shale.....						
Thickness of bed.....	5	0	5	6½	5	11
Thickness of coal sampled.....	3	11	4	9	4	11

a Not included in sample.

Section A (sample 14250) was measured at the face of the main straight entry H, 2,250 feet northwest of the mine mouth.

Section B (sample 14251) was measured at the face of G-1 heading, 2,250 feet west of the mine mouth.

Section C (sample 14252) was measured at the face of room 11 off G-2 heading, 1,900 feet southwest of the mine mouth.

Sections of coal bed in Sagamore No. 2 mine.

Section.....	A	B	C	D
Laboratory No.....	14253	14254	14255	14256
Roof, sandy shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 4	1 0	0 3	0 11½
Coal, gray.....	0 2	.. ..	0 2	.. ..
"Sulphur" band.....	.. ..	.. ..	.. ..	0 ½
Coal.....	0 6½	.. ..	0 7	0 2½
"Sulphur" band.....	0 ½	α 0 ½	α 0 ½	.. ..
Bone.....	α 0 4	α 0 3½	α 0 3½	0 ½
Coal.....	.. ..	0 7½	0 7	0 6½
Coal, gray.....	.. ..	0 3½	0 3	0 3
Coal.....	2 3	2 2½	2 4	1 9
Mother coal.....	0 ½	.. ..	.. ..	0 ½
Coal.....	0 9½	.. ..	.. ..	0 8½
Floor, shale.....	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	4 6	4 5½	4 6	4 6
Thickness of coal sampled.....	4 2	4 1½	4 2	4 6

α Not included in sample.

Section A (sample 14253) was measured at the face of H-8 entry, 2,550 feet southeast of the mine mouth.

Section B (sample 14254) was measured at the face of G-6 entry, 2,300 feet southwest of the mine mouth.

Section C (sample 14255) was measured at the face of G-8 entry, 2,550 feet south of the mine mouth.

Section D (sample 14256) was measured at the face of the straight H air course, 2,350 feet southeast of the mine mouth.

A composite sample was made by mixing face samples 14250 to 14256, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 14257.

Notes.—The Sagamore mines are opened by drift entries and the coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut by electric chain machines and by hand. FFF black powder was used for breaking down the coal and a permissible explosive for brushing the roof. About 30 per cent of the coal was shipped as run-of-mine. The screening plant was equipped with shaking screens 5 by 12 feet with openings 4 by 6 inches. About 75 per cent of the coal passed through this screen. The smaller sizes of coal were run over shaking screens 5 by 20 feet, with holes 3 inches, 1½ inches, and 1 inch in diameter. There were two belt conveyors at which a number of pickers were employed. The screenings were washed, yielding coal of a maximum size of 1½ inches and producing nut and slack coal. The washery had a capacity of 600 tons per day. There were 3 loading tracks with a capacity of 40 empty and 50 loaded cars and storage bins for 200 tons. The tippie and washery equipment was very complete and the preparation for market was thorough. The coal being loaded was chiefly in large lumps which had a good appearance. Daily output of the two mines, 800 tons. There was about 3,000 acres of unmined coal, a large part of which was tributary to the two mines. About 30 per cent of the output was from advance workings and the remainder from pillars.

WEYANOKE. WEYANOKE NO. 1 AND NO. 2 MINES.

Sample.—Semibituminous coal; Pocahontas field; analyses Nos. 14224, 14225, 14226, 14227, 14228, 14229, and 14230 (p. 126).

Mine.—Weyanoke No. 1 and No. 2, Norfolk & Western district; drift mines about one-fourth mile north of Weyanoke station on the Wenonah branch of the Norfolk & Western Railway.

Coal bed.—Pocahontas No. 3. Carboniferous (Pottsville) age, Pocahontas formation. Average thickness, 4 feet. There are no faults or horsebacks, but there are occasional rolls and local dips. The cleat is well marked. The roof consists of about 8 inches of "draw slate," which is taken down after loading out the coal. Above the "draw slate" is a main cap rock. Particles of the roof sometimes got mixed with the coal. The floor consists of 8 to 10 inches of dark shale, under which is 4 inches of coal; under the coal is sandstone. Cover, 300 to 400 feet.

The coal bed was measured and sampled at 4 points in No. 1 mine and at 2 points in No. 2 mine by H. I. Smith and G. H. Deike on July 1, 1912, as described below:

Sections of coal bed in Weyanoke No. 1 and No. 2 mines at Weyanoke.

Section.....	A 14224	B 14225	C 14226	D 14227	E 14228	F 14230
Laboratory No.....	14224	14225	14226	14227	14228	14230
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Cannel (cube) coal.....	<i>a</i> 0 $\frac{1}{2}$	<i>a</i> 0 1	<i>a</i> 0 $\frac{1}{2}$	<i>a</i> 0 1	<i>a</i> 0 1	<i>a</i> 0 1
Coal.....	1 0	0 10	1 0	1 0	0 9	1 0
Bone, gray.....	.. ..	<i>a</i> 0 $1\frac{1}{2}$	<i>a</i> 0 $2\frac{1}{2}$	0 $\frac{1}{2}$	0 $\frac{1}{2}$	<i>a</i> 0 4
Coal.....	.. ..	0 4	.. ..	0 2	0 2	1 9
Coal, gray.....	<i>a</i> 0 2	0 4	.. ..	0 $\frac{3}{4}$	<i>a</i> 0 $2\frac{1}{2}$	0 $\frac{1}{2}$
Coal.....	.. ..	.. ..	.. ..	0 7	1 4	.. ..
Mother coal.....	.. ..	.. ..	.. ..	0	0 $\frac{1}{2}$	.. ..
Coal.....	2 11	2 4	3 3	2 $1\frac{3}{8}$	1 $8\frac{1}{2}$	1 $1\frac{1}{2}$
Floor, dark shale.....	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	4 $1\frac{1}{2}$	4 $\frac{1}{2}$	4 6	4 0	4 $3\frac{1}{2}$	4 4
Thickness of coal sampled.....	3 11	3 10	4 3	3 11	4 0	3 11

a Not included in sample.

Section A (sample 14224) was measured at the face of room 11, off left entry 9, off main heading of No. 1 mine.

Section B (sample 14225) was measured at the face of the main air course of No. 1 mine.

Section C (sample 14226) was measured at the face of room 22, off eighth left cross heading of No. 1 mine.

Section D (sample 14227) was measured at the face of right entry 3, off main entry of No. 2 mine.

Section E (sample 14228) was measured at the face of room 6, off left entry 6 of No. 1 mine.

Section F (sample 14230) was measured on pillar of last crosscut in room 7, off second left butt entry of No. 2 mine.

A composite sample was made by combining and mixing samples 14224, 14225, 14226, 14227, and 14228. The results of an ultimate analysis of this sample are given under laboratory No. 14229.

Notes.—The Weyanoke mines are opened by drifts and the coal is mined by the room-and-pillar system. At the time of sampling the coal was top cut by electric chain machines and broken out with FFF black blasting powder; permissible explosives were used for brushing the floor and roof. The machine cuttings were loaded out with the coal. None of the coal was shipped as run-of-mine, and about 25 per cent passed through bar screens 16 feet long having $1\frac{1}{4}$ -inch openings. Twelve men were employed as pickers on the belt. The lumps on the car were large and had a good appearance. There were two loading tracks, with a capacity of 25 empty cars and 30 loaded cars. Most of the coal was shipped for domestic purposes. The daily output of both mines was 600 tons, with a maximum day's run of 1,000 tons. Ten per cent of the coal came from advance workings and the remainder from pillars. About 1,000 acres remained to be mined through the existing openings.

MONONGALIA COUNTY.

RICHARD. ELKINS No. 1 MINE.

Sample.—Bituminous coal; analyses Nos. W12204, W19475, W19476, W19477, W19478, and W19479 (pp. 126, 127).

Mine.—Elkins No. 1; Monongahela district; a slope mine $\frac{1}{2}$ mile northeast of Richard, on the Morgantown & Kanawha Railroad, with connections to the Baltimore & Ohio Railroad at Rowlesburg.

Coal bed.—Upper Freeport. Carboniferous age, Allegheny formation. Average thickness, 4 feet. Roof, low-grade coal about $3\frac{1}{2}$ feet thick, overlain by sandstone; floor, hard clay with smooth surface.

The bed was measured and sampled at five points in the mine by G. S. Pope, April 22, 1911, as described below:

Sections of coal bed in Elkins No. 1 mine.

Section.....	A	B	C	D	E
Laboratory No.....	W19475	W19476	W19477	W19478	W19479
Roof, coal and sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	0 8 $\frac{3}{4}$	2 7	2 6 $\frac{1}{2}$	2 8	2 8 $\frac{1}{2}$
Mother coal.....	0 3	.. ..	0 1	.. ..	.. ..
Coal.....	2 1 $\frac{1}{2}$	.. ..	0 4	.. ..	.. ..
Shale.....	a 0 1 $\frac{1}{2}$	a 0 1 $\frac{1}{4}$	a 0 3	a 0 2 $\frac{1}{4}$	a 0 2 $\frac{1}{4}$
Coal.....	0 11 $\frac{1}{4}$	0 3	1 2	1 1	0 6
"Sulphur".....	.. ..	a 0 3	.. ..	.. ..	.. ..
Coal.....	.. ..	0 3 $\frac{1}{2}$	.. ..	.. ..	.. ..
Mother coal.....	.. ..	0 4	.. ..	.. ..	0 7 $\frac{1}{4}$
Coal.....	.. ..	0 4	.. ..	.. ..	0 7 $\frac{1}{4}$
Coal and parting.....	a 0 1	.. ..	.. ..	.. ..	.. ..
Floor, hard clay.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	4 3	3 7 $\frac{5}{8}$	4 2 $\frac{1}{4}$	3 11 $\frac{1}{4}$	4 3
Thickness of coal sampled.....	3 10 $\frac{1}{4}$	3 6	4 1 $\frac{1}{2}$	3 9	3 10 $\frac{1}{4}$

a Not included in sample.

Section A (sample W19475) was measured at the face of the fifth right "flat," 4,200 feet northeast of the drift mouth.

Section B (sample W19476) was measured at the face of butt entry 8 off fifth right entry, about 700 feet from the main entry.

Section C (sample W19477) was measured at the face of first right heading, 4,200 feet from the drift mouth.

Section D (sample W19478) was measured at the face of butt entry 11, off first right entry, 750 feet from right entry 1.

Section E (sample W19479) was cut from butt entry 5, off fifth right "flat," 1,400 feet from fifth "flat."

A composite sample was made by mixing samples W19475, W19476, W19477, W19478, and W19479. The results of an ultimate analysis of this sample are given under laboratory No. W12204.

Notes.—The Elkins No. 1 mine is opened both by drift entries and a slope. At the time of sampling the coal was undercut by hand and machines and shot down with black powder. There were two loading tracks with a capacity for 20 cars. Pickers were employed on the cars in loading. The mine was equipped to produce 700 tons per day. Average daily output 425 tons, the larger part of which was from advance workings. There was about 500 acres of coal tributary to this and other openings.

PRESTON COUNTY.

MASONTOWN. ELKINS No. 6 MINE.

Sample.—Bituminous coal; analyses Nos. W19493, W19494, W19540, and W19541 (p. 127).

Mine.—Elkins No. 6; Monongahela district; a drift mine at Masontown, on the Morgantown & Kanawha Railroad with connections to the Baltimore & Ohio Railroad at Rowlesburg.

Coal bed.—Upper Freeport. Carboniferous age, Allegheny formation. Average thickness, 4 feet. Roof, shale, bone, and dirty coal, overlain by sandstone; floor, smooth hard fire clay.

The bed was measured and sampled at four points in the mine by G. S. Pope, April 24, 1911, as described below:

Sections of coal bed in Elkins No. 6 mine.

Section.....	A	B	C	D
Laboratory No.....	W19493	W19494	W19540	W19541
Roof, shale, bone, dirty coal and sandstone.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 2 $\frac{1}{2}$	1 9 $\frac{1}{2}$	2 0	2 8
"Sulphur".....	0	—	—	—
Coal.....	0 6	—	—	—
Mother coal.....	0	0 3	0	—
Coal.....	0 10	0 8	0 7 $\frac{1}{2}$	—
Shale.....	a 0 1 $\frac{1}{2}$	a 0 2 $\frac{1}{4}$	a 0 2	a 0 2 $\frac{1}{2}$
Coal.....	0 3 $\frac{1}{2}$	0 3 $\frac{1}{2}$	0 4	0 3 $\frac{1}{2}$
Bone.....	0	0	0	0
Coal.....	0 8 $\frac{1}{2}$	0 9 $\frac{1}{2}$	0 7 $\frac{1}{2}$	0 9
Shale.....	0	0	0	0
Coal.....	0 3 $\frac{1}{2}$	0 3 $\frac{1}{2}$	0 3	0 3 $\frac{1}{2}$
Floor, hard, smooth fire clay.....				
Thickness of bed.....	4	4	4	4
Thickness of coal sampled.....	3 11 $\frac{1}{2}$	3 11	3 11 $\frac{1}{2}$	4

a Not included in sample.

Section A (sample W19493) was measured at the face of the first butt heading, 600 feet from the third "flat," 150 feet from the main entry.

Section B (sample W19494) was measured at the face of the third right entry, 50 feet from the main entry.

Section C (sample W19540) was measured at the face of the second butt heading, 1,000 feet from the main entry.

Section D (sample W19541) was measured at the face of the second butt entry, 700 feet from the second "flat," 300 feet from the main entry.

A composite sample was made by mixing samples W19493, W19494, W19540, and W19541. The results of an ultimate analysis of this sample are given under laboratory No. 12225.

Notes.—The Elkins No. 6 mine is opened by a drift entry. The mine is comparatively new, and only a few side entries have been started. At the time of sampling the coal was undercut by hand and broken down with black powder. There was one loading track at the tippie with a capacity of 15 cars. There were no screens, the entire production being shipped as run-of-mine. Pickers were employed on the cars in loading. All of the coal was used for coking purposes. There was 1,200 acres of unmined area tributary to this opening.

RALEIGH COUNTY.

HOTCOAL. BIG STICK MINE.

Sample.—Semibituminous coal; New River field; analyses Nos. 14375, 14376, 14377, and 14378 (p. 127).

Mine.—Big Stick; Kanawha-New River district; a drift mine at Hotcoal, with railroad connections to the Virginian Railway.

Coal bed.—Beckley. Carboniferous age, Pottsville formation. Average thickness, 5 feet 6 inches; dip, 2 $\frac{1}{2}$ ° northeast. The roof consists of 3 inches of "draw slate," above which is 2 feet of dark carbonaceous shale mixed with coal, above which is sandstone cap rock. Floor, hard, smooth shale. Material from the roof and floor does not become mixed with the coal in mining. Cover, 150 to 250 feet.

The coal bed was measured and sampled at 3 points in the mine by J. J. Rutledge, July 8, 1912, as described below:

Sections of coal bed in Big Stick mine.

Section.....	A	B	C
Laboratory No.....	14375	14376	14377
Roof, "draw-slate," shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	a 0 1	-- --	a 0 3 ³ ₄
Shale, black.....	a 0 1	-- --	a 0 1
Coal, dirty.....	a 0 3 ³ ₄	-- --	a 0 3 ³ ₄
Coal.....	3 3	2 6	3 4
Mother coal.....	-- --	0 3 ¹ ₂	-- --
Coal.....	-- --	0 10	-- --
Cannel coal.....	0 1 ¹ ₄	-- --	0 3
Coal, bony.....	-- --	0 3 ³ ₄	-- --
Coal.....	2 0	1 10	2 6
Floor, fire clay.....			
Thickness of bed.....	5 6	5 3 ¹ ₄	6 3 ¹ ₂
Thickness of coal sampled.....	5 3 ¹ ₄	5 3 ¹ ₄	6 1

a Not included in sample.

Section A (sample 14375) was measured at the face of left heading 2, 1,600 feet east of the mouth of the straight main entry.

Section B (sample 14376) was measured at the face of left entry 3, off the straight main entry, 1,400 feet northeast of the mine mouth.

Section C (sample 14377) was measured at the face of the straight main entry, 1,900 feet northeast of the mine mouth.

A composite sample was made by mixing face samples 14375, 14376, and 14377. The results of an ultimate analysis of this sample are given under laboratory No. 14378.

Notes.—The Big Stick mine is opened by two entries and the coal mined by the room-and-pillar system. At the time of sampling the coal was undercut by hand and shot down with FF black blasting powder. A permissible explosive was also used in some parts of the mine. All of the coal was shipped as run-of-mine. Pickers were employed on the car in loading. There was no screening plant. The mine was new having been in operation only about 1 year at the time of sampling. All of the coal was obtained from advance workings. Daily output, 450 tons per day, with a maximum capacity of 500 tons.

MCQUADE. BLUE JAY No. 4 MINE.

Sample.—Semibituminous coal; New River field; analyses Nos. 14288, 14289, 14290, and 14291 (p. 128).

Mine.—Blue Jay No. 4; Kanawha-New River district; a drift mine at McQuade station 2 miles southeast of Raleigh, on the Piney branch of the Chesapeake & Ohio Railway.

Coal bed.—Beckley. Carboniferous age, Pottsville formation. Average thickness, 5 feet; slight dip, northwest. Roof, smooth shale 1 to 2 feet thick; floor, very soft fire clay; material from the roof and the floor does not become mixed with the coal in mining. Cover at points of sampling 75 to 100 feet.

The coal bed was measured and sampled at three points in the mine by D. J. Price, July 10, 1912, as described below:

Sections of coal bed in Blue Jay No. 4 mine.

Section.....	A	B	C
Laboratory No.....	14288	14289	14290
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 4	1 2	1 2
Bone and shale.....	a 0 9	a 0 3	-- --
Coal, bony.....	-- --	-- --	0 3
Coal.....	2 10	3 0	3 0
Floor, soft fire clay.....			
Thickness of bed.....	4 11	4 5	4 5
Thickness of coal sampled.....	4 2	4 2	4 5

a Not included in sample.

Section A (sample 14288) was measured on a pillar of the main heading about 600 feet east of the mine mouth.

Section B (sample 14289) was measured at the face of the second right heading, 400 feet south of the mine mouth.

Section C (sample 14290) was measured on the pillar of the first right heading, 250 feet south of the mine mouth.

A composite sample was made by mixing samples 14288, 14289, and 14290. The result of an ultimate analysis of this sample are shown under laboratory No. 14291.

Notes.—The Blue Jay No. 4 mine is opened by drift entries and the coal mined by the room-and-pillar system. At the time of sampling the coal was undercut by hand. As the mining operations were confined entirely to pillars, no powder was used in breaking the coal. All of the coal was shipped as run-of-mine. Pickers were employed on the cars in loading. Daily output, about 150 tons. There was one loading track with a capacity for 10 empty and 7 loaded cars.

RALEIGH. RALEIGH NO. 1 AND NO. 3 MINES.

Samples.—Semibituminous coal; New River field; analyses Nos. 10624, 10625, 10626, 10627, 10628, and 10630 (p. 128).

Mine.—Raleigh No. 1 and No. 3; Kanawha-New River district; slope mines at Raleigh, on the Chesapeake & Ohio Railway.

Coal bed.—Beckley. Carboniferous (Pottsville) age. Quinimont formation. Average thickness, 52 inches; dip about 2° N. 50° W.; roof, shale 2 feet thick with a sandstone capping 90 feet thick; floor, hard, smooth, gray shale.

The bed was measured and sampled at five points in the mines by J. J. Rutledge on June 25, 1910, as described below:

Sections of coal bed in Raleigh No. 1 and No. 3 mines.

Section.....	A	B	C	D	E
Laboratory No.....	10624	10625	10626	10627	10630
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 4	1 4	1 0	.. ..	1 3
Coal, soft.....	0 0	0 1	0 1	.. ..	0 4
Coal.....	3 10½	2 9½	3 14½	3 7½	3 10½
Floor, shale.....					
Thickness of bed.....	5 2½	4 2	4 17½	3 7½	5 1½
Thickness of coal sampled.....	5 2½	4 2	4 18½	3 7½	5 1½

Section A (sample 10624) was measured on the left rib of left entry 7 opposite the mouth of right heading 1 in No. 3 mine.

Section B (sample 10625) was measured at the face of right entry 15 in No. 3 mine.

Section C (sample 10626) was measured at the last crosscut in the main entry in No. 3 mine.

Section D (sample 10627) was measured at the face of room 11 off right heading 12 in No. 3 mine.

Section E (sample 10630) was measured at the neck of the last break-through off right entry 6 in No. 1 mine.

A composite sample was made by mixing samples 10624 to 10627, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 10628.

Notes.—No. 1 and No. 3 mines are connected and in reality form but a single mine, opened by two drift entries; double entry, room-and-pillar system of mining. At the time of sampling black powder was used for breaking coal after undercutting with electric chain cutters; bar screens; capacity, 1,000 tons a day; two loading tracks with capacity for 40 cars; unmined area about 2,000 acres.

SLAB FORK. SLAB FORK NO. 1, NO. 2, NO. 3, NO. 4, AND NO. 5 MINES.

Sample.—Semibituminous coal; New River field; analyses Nos. 14313 to 14318, and 14325 to 14337 (pp. 129, 130).

Mines.—Slab Fork No. 1, No. 2, No. 3, No. 4, and No. 5; Kanawha-New River district; drift mines; Nos. 1, 2, 3, and 4 are about three-fourths of a mile northeast of Slab Fork; No. 5 is one-fourth of a mile south of Slab Fork, on the Virginian Railway.

Coal bed.—Beckley. Carboniferous (Pottsville) age, Quinnimont formation. Thickness, 3 feet 5 inches to 4 feet 7 inches. Dip slightly irregular, but the main direction is northwest. Roof, sandy shale containing about 3 inches of roof coal. The shale and roof coal combined vary in thickness from 18 inches to 3 feet, above which there is a sandstone cap rock. Floor, hard smooth clay. Material from the roof and floor did not become mixed with the coal in mining. Cover at points of sampling, 100 to 400 feet.

The coal bed was measured and sampled at 15 points in the five mines by G. H. Deike and H. I. Smith July 10 and 11, 1912, as described below:

Sections of coal bed in Slab Fork No. 1 and No. 4 mines.

Section.....	No. 4 14336	No. 1 14337
Laboratory No.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, sandy shale.....	0 11	a 0 1½
Coal.....	0 11	a 0 ½
Shale.....	0 8½	2 7
Mother coal.....	0 1	Streak.
Coal.....	0 2	.. ..
"Sulphur".....	0 2½	.. ..
Coal, gray.....	0 1	.. ..
Coal.....	1 8	1 4
Coal, gray.....	a 0 3	a 0 4
Coal, bony.....	.. ..	0 11½
Floor, clay.....	4 ¾	5 4½
Thickness of bed.....	3 9¼	4 10½
Thickness of coal sampled.....		

a Not included in sample.

Section A (sample 14336) was measured at the face of the main entry, about 1,450 feet northwest of the mine mouth.

Section B (sample 14337) was measured on the pillar of room 7, off second right entry, 1,200 feet northeast of the mine mouth.

Sections of coal bed in Slab Fork No. 2 mine.

Section.....	A 14325	B 14326	C 14328	D 14329	E 14330
Laboratory No.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof, sandy shale.....	a 0 3	a 0 3	a 0 3	a 0 2	a 0 2½
Coal.....	a 0 1½	a 0 3	a 0 3	a 0 1	a 0 3½
Shale.....	0 5	0 2	0 2	0 1½	0 2
Coal.....	0 2	0 4	0 4	0 4½	0 4
Coal, gray.....	3 5	3 6	1 3½	2 2½	3 6
Coal.....	0 1	.. ..	0 1	0 ½	.. ..
Mother coal.....	0 9	.. ..	1 10	1 4	.. ..
Coal.....	a 0 4	.. ..	.. ..	a 0 1	.. ..
Bone.....					
Floor, clay.....	5 6½	4 6	4 2	4 4¾	4 6
Thickness of bed.....	4 10	4 0	3 8	4 ¾	4 0
Thickness of coal sampled.....					

a Not included in sample.

Section A (sample 14325) was measured on the pillar of third left entry, between rooms 7 and 8, 1,800 feet southwest of the mine mouth.

Section B (sample 14326) was measured on the pillar between rooms 8 and 10, off seventh left entry, 3,000 feet southwest of the mine mouth.

A composite sample was made by mixing pillar samples 14325 and 14326. The results of an ultimate analysis of this sample are shown under laboratory No. 14327.

Section C (sample 14328) was measured on the face of the first panel off the second drift, 4,200 feet south of the mine mouth.

Section D (sample 14329) was measured at the face of first right entry, off third left entry, 1,200 feet southeast of the mine mouth.

Section E (sample 14330) was measured at the face of fourteenth left entry, 150 feet from the straight main entry, 5,000 feet southwest of the mine mouth.

A composite sample was made by mixing face samples 14328, 14329, and 14330. The results of an ultimate analysis of this sample are shown under laboratory No. 14331

Sections of coal bed in Slab Fork No. 3 mine.

Section.....	A	B	C
Laboratory No.....	14332	14333	14334
Roof, sandy shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	.. ..	a 0 1½	0 1½
Shale.....	.. ..	a 0 1	a 0 1
Coal, impure.....	.. ..	a 0 2	.. ..
Coal.....	0 4	0 9½	1 ½
Coal, hard.....	.. ..	0 2	0 2
Coal, soft.....	.. ..	1 2	.. ..
Mother coal.....	.. ..	0 ½	.. ..
Coal, bony.....	0 1½	.. ..	.. ..
Coal.....	.. ..	0 4½	.. ..
Mother coal.....	.. ..	0 1	.. ..
Coal.....	3 5	0 4½	2 9
Mother coal.....	.. ..	a 0 1	.. ..
Shale, bony.....	a 0 4	.. ..	a 0 3
Coal.....	1 0	0 8½	.. ..
Coal, bony.....	a 0 1	.. ..	.. ..
Floor, clay.....	.. ..	.. ..	.. ..
Thickness of bed.....	5 3½	4 2	4 5
Thickness of coal sampled.....	4 10½	3 8½	4 1

a Not included in sample.

Section A (sample 14332) was measured at the face of the main air course, 2,450 feet southeast of the mine mouth.

Section B (sample 14333) was measured at the face of A entry, 2,350 feet southeast of the mine mouth.

Section C (sample 14334) was measured at the face of room 3, off the first right entry, 2,600 feet southeast of the mine mouth.

A composite sample was made by mixing face samples 14332, 14333, and 14334. The results of an ultimate analysis of this sample are given under laboratory No. 14335.

Sections of coal bed in Slab Fork No. 5 mine.

Section.....	A	B	C	D	E
Laboratory No.....	14313	14314	14315	14316	14318
Roof, sandy shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal, gray.....	.. ..	.. ..	0 4	.. ..	.. ..
Coal.....	a 0 2	.. ..	0 6½	.. ..	.. ..
Coal with "sulphur".....	.. ..	.. ..	.. ..	a 0 2½	.. ..
Shale.....	a 0 3	.. ..	Streak.	a 0 1	.. ..
Coal.....	1 0	0 10	0 6	0 11½	1 0
Coal, gray.....	.. ..	.. ..	0 2½	.. ..	.. ..
Shale.....	a 0 2	a 0 ½	.. ..	0 ½	0 ½
Coal.....	.. ..	0 7	0 2½	.. ..	.. ..
Coal, gray.....	.. ..	0 2	0 2	.. ..	.. ..
Coal.....	2 10	1 11½	1 8	2 9	2 9
Floor, hard clay.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	4 5	3 7	3 7½	4 ½	3 9½
Thickness of coal sampled.....	3 10	3 6½	3 7½	3 8½	3 9½

a Not included in sample.

Section A (sample 14313) was measured at the face of the main heading, 3,200 feet southwest of the mine mouth.

Section B (sample 14314) was measured at the face of room 15, off the sixth left entry, 2,000 feet southwest of the mine mouth.

Section C (sample 14315) was measured at the last cut-through, off the third left entry, 1,900 feet southeast of the mine mouth.

Section D (sample 14316) was measured on the pillar of room 10, off the second left entry, 800 feet south of the mine mouth.

Section E (sample 14318) was measured on the pillar of fourth left entry, between rooms 13 and 14, 1,250 feet south of the mine mouth.

A composite sample was made by mixing samples 14313 to 14316, inclusive. The results of ultimate analysis of this sample are shown under laboratory No. 14317.

Notes.—All of these mines are opened by drift entries and the coal mined by the room-and-pillar system. At the time of sampling, electric chain machines were used for undercutting the coal in Nos. 2, 3, and 4 mines. Machines were not used in the other mines. A permissible explosive was used for breaking the coal and for brushing the roof. All of the coal was shipped as run-of-mine. Pickers were employed on the cars in loading. No. 5 mine was equipped with 2 loading tracks with a capacity for 15 empty and 15 loaded cars; the other mines have 2 loading tracks with a capacity for 40 empty and 40 loaded cars.

The capacity of the mines was as follows: No. 1 mine, 30 tons a day; No. 2 mine, 350 tons a day; No. 3 mine, 170 tons a day; No. 4 mine, 60 tons a day, and No. 5 mine, 425 tons, or a total capacity of 1,035 tons a day. About 35 per cent of the coal was obtained from advance work. There was approximately 1,800 acres of unmined coal tributary to the various openings.

WINDING GULF. LYNWIN MINE.

Sample.—Semibituminous coal; New River field; analyses Nos. 14319, 14320, 14321, 14322, 14323, and 14324 (p. 130).

Mine.—Lynwin; Kanawha-New River district; a drift mine, one-fourth of a mile south of Winding Gulf on the Winding Gulf branch of the Virginian Railway.

Coal bed.—Beckley. Carboniferous (Pottsville) age, Quinnimont formation. Average thickness 5 feet; dip, slight, to the northwest. Roof, light blue shale to which the coal adheres more or less; floor, hard smooth shale that does not become mixed with the coal in mining. Cover, 400 feet.

The coal bed was measured and sampled at five points in the mine by D. J. Price on July 11, 1912, as described below:

Sections of coal bed in Lynwin mine.

Section.....	A	B	C	D	E
Laboratory No.....	14319	14320	14321	14322	14323
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 0	2 9	2 10	2 8	2 9
Shale and bone.....	^a 0 4	^a 0 5	^a 0 5	^a 0 7	^a 0 6½
Coal.....	2 0	1 7	1 11	1 11	2 0
Floor, shale.....					
Thickness of bed.....	5 4	4 9	5 2	5 2	5 3½
Thickness of coal sampled.....	5 0	4 4	4 9	4 7	4 9½

^a Not included in sample.

Section A (sample 14319) was measured at the break-through to the air course at left entry 6, about 2,600 feet from the mine mouth.

Section B (sample 14320) was measured at the face of right heading 6, about 2,800 feet from the mine mouth.

Section C (sample 14321) was measured at the face of room 2, right heading 8, about 3,300 feet from the mine mouth.

Section D (sample 14322) was measured at the face of right heading 8, 3,400 feet from the mine mouth.

Section E (sample 14323) was measured at the face of the main heading, 3,200 feet from the mine mouth.

A composite sample was made by mixing face samples 14319 to 14323, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 14324.

Notes.—The Lynwin mine is opened by a drift entry and the coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut by hand and broken down with FFF black powder and a permissible explosive. All of the coal was shipped as run-of-mine. The screening plant had bar screens 6 by 12 feet with 3-inch openings. Pickers were employed on the car in loading. The run-of-mine coal contained large lumps and presented a good appearance on the cars. There were two loading tracks with a capacity for 22 empty and 22 loaded cars. There was approximately 600 acres of unmined coal tributary to this opening. A large percentage of the coal was obtained from advance work. Daily output, 450 tons, with a capacity of 550 tons.

WINDING GULF. WINDING GULF No. 1 AND No. 2 MINES.

Sample.—Semibituminous coal; New River field; analyses Nos. 14368, 14369, 14370, 14371, 14372, 14373, and 14374 (p. 131).

Mine.—Winding Gulf No. 1; Kanawha-New River district; at Winding Gulf on the Winding Gulf branch of the Virginian Railway. No. 2 mine is 1 mile from Winding Gulf on Winding Gulf branch of the Chesapeake & Ohio Railway.

Coal bed.—Beckley. Carboniferous (Pottsville) age, Quinimont formation. Average thickness, 4 feet 6 inches. Dip about 2° northwest. Roof, smooth gray shale; floor, hard fire clay. Material from the roof and floor does not become mixed with the coal in mining. Cover at points of sampling, 60 to 400 feet.

The coal bed was measured and sampled at three points in No. 1 mine and at two points in No. 2 mine by D. J. Price July 9, 1912, as described below:

Sections of coal bed in Winding Gulf No. 1 mine.

Section.....	A	B	C
Laboratory No.....	14368	14369	14370
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	2 11	2 10	2 11
Coal, bone.....	a 0 3	a 0 3	a 0 4
Coal.....	1 2	1 3	1 6
Floor, fire clay.....			
Thickness of bed.....	4 4	4 4	4 9
Thickness of coal sampled.....	4 1	4 1	4 5

a Not included in sample.

Section A (sample 14368) was measured at the face of room 14, off left entry 1, off the main right heading.

Section B (sample 14369) was measured at the face of the air course of the west entry.

Section C (sample 14370) was measured at the face of the main right heading.

A composite sample was made by mixing face samples 14368, 14369, and 14370. The results of an ultimate analysis of this sample are given under laboratory No. 14371.

Sections of coal bed in Winding Gulf No. 2 mine.

Section.....	A	B
Laboratory No.....	14372	14373
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 0	3 2
Coal, bone.....	a 0 4	a 0 3
Coal.....	0 9	1 6
Floor, fire clay.....		
Thickness of bed.....	4 1	4 11
Thickness of coal sampled.....	3 9	4 8

a Not included in sample.

Section A (sample 14372) was measured on the pillar at the break-through to right heading 1.

Section B (sample 14373) was measured at the face of left heading 2.

A composite sample was made by mixing samples 14372 and 14373. The results of an ultimate analysis of this sample are given under laboratory No. 14374.

Notes.—Both of these mines were comparatively new at the time of sampling. Both mines are opened by a slope and the coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut by electric machines and broken down with permissible explosives. All of the coal was shipped as run-of-mine. Pickers were employed on the cars in loading. The average daily output of No. 1 mine was 400 tons.

WOODBAY. McALPIN No. 1 MINE.

Sample.—Semibituminous coal, New River field; analyses Nos. 14301, 14302, 14303, 14304, 14305, 14306, 14307, 14308, and 14309 (p. 131).

Mine.—McAlpin No. 1; Kanawha-New River district; a drift mine at Woodbay Station on the Winding Gulf branch of the Virginian Railway.

Coal bed.—Beckley. Carboniferous (Pottsville) age, Quinnimont formation. Average thickness, 5 feet; dip, $1\frac{1}{2}^{\circ}$ northwest. Roof, shale 2 to 3 feet thick, containing streaks of coal, above the shale which is a cap rock; floor, a dark soft, smooth carbonaceous shale. Material from the roof and floor did not become mixed with the coal in mining. Cover at points of sampling, about 400 feet.

The bed was measured and sampled at eight points in the mine by J. J. Rutledge and D. J. Price, July 6, 1912, as described below:

Sections of coal bed in McAlpin No. 1 mine.

Section.....	A	B	C	D
Laboratory No.....	14301	14302	14303	14304
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 1	2 7	2 3	2 9
Mother coal.....	0 $\frac{1}{8}$	.. ..	.. ..	0 $\frac{1}{4}$
Coal.....	0 9 $\frac{1}{2}$	1 3	1 4	0 11
Cannel coal.....	0 3	0 2	0 2	0 3
Coal.....	1 3	1 3	2 6	1 4
Floor, shale.....				
Thickness of bed.....	5 4 $\frac{3}{8}$	5 3	6 3	5 3 $\frac{1}{2}$
Thickness of coal sampled.....	5 4 $\frac{3}{8}$	5 3	6 3	5 3 $\frac{1}{2}$

Sections of coal bed in McAlpin No. 1 mine.

Section.....	E	F	G	H
Laboratory No.....	14305	14306	14307	14308
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 3	3 3	3 2	3 3
Coal, bony.....	a 0 4	a 0 4 $\frac{1}{2}$	a 0 3 $\frac{1}{2}$	a 0 4 $\frac{1}{2}$
Coal.....	0 11 $\frac{1}{2}$	0 8	0 10	0 9
Floor, shale.....				
Thickness of bed.....	4 6 $\frac{1}{2}$	4 3 $\frac{1}{2}$	4 3 $\frac{1}{2}$	4 4 $\frac{1}{2}$
Thickness of coal sampled.....	4 2 $\frac{1}{2}$	3 11	4 0	4 0

a Not included in sample.

Section A (sample 14301) was measured at the face of the second panel, off left heading 3, off second main entry.

Section B (sample 14302) was measured at the face of the second main air course.

Section C (sample 14303) was measured at the face of room 10, second panel, left entry 2.

Section D (sample 14304) was measured at the face of room 3, first panel, left entry 3.

Section E (sample 14305) was measured on the pillar of main heading 1, between right entries 3 and 4.

Section F (sample 14306) was measured at the face of the second panel, off right heading 2.

Section G (sample 14307) was measured at the face of the fourth panel, off right heading 2.

Section H (sample 14308) was measured on the pillar of the air course, near right entry 2.

A composite sample was made by mixing samples 14301 to 14308, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 14309.

Notes.—The McAlpin No. 1 Mine is opened by drift entries and the coal mined by a combination of the room-and-pillar and panel systems. At the time of sampling the coal was undercut by electric punchers and shot down with a permissible explosive. A permissible explosive was also used for brushing the roof. All of the coal was shipped as run-of-mine. The mine was equipped with a screening plant in which the bar screens had 1½-inch openings. The coal was hand-picked prior to loading on a conveying table about 170 feet long. The coal presented a good appearance when loaded on the cars. There were two loading tracks with a capacity for 31 empty and 36 loaded cars. All of the coal was obtained from advance work. Output, 1,000 tons day, with a maximum output of about 1,500 tons.

RANDOLPH COUNTY.

MILL CREEK. TOLBERT AND SPIKER MINE.

Sample.—Bituminous coal; analysis No. 13561 (p. 132).

Mine.—Tolbert and Spiker; Monongahela district; on Mill Creek, 6 miles south of the town of Mill Creek.

Coal bed.—Sewell (?). Carboniferous age, Pottsville formation. Average thickness about 4 feet; dip, 8° west.

The bed was measured and sampled at one point by E. R. Lloyd on March 19, 1912, as described below:

Section of coal in Tolbert and Spiker mine.

Laboratory No.	13561
Roof, dark shale.	<i>Ft. in.</i>
Coal.	1 7
Bone.	a 0 5
Coal.	2 0
Shale.	
Thickness of bed.	4 0
Thickness of coal sampled.	3 7

a Not included in sample.

The sample was collected about 100 feet north of the mouth of the mine about 40 feet from the outcrop, under about 75 feet of cover. Average output, about 2½ tons a day. The mine is located on the northeast face of Rich Mountain, at an elevation of about 2,750 feet.

SPRUCE. HOPKINS MINE.

Sample.—Bituminous coal; analysis No. 13601 (p. 132).

Mine.—Hopkins; Monongahela district; about 9 miles southwest of Cheat Bridge, on Cheat River lumber road of West Virginia Pulp & Paper Co., and about 5 miles from Spruce.

Coal bed.—Sewell (?). Carboniferous age, Pottsville formation. Thickness at point where sampled, 4 feet 7 inches clear coal, which is about the average thickness within the mine. Roof and floor, shale. The mine is near the top of Cheat Mountain at an elevation of over 4,000 feet. Sample was collected in the mine 1,075 feet southwest of the mine mouth by E. R. Lloyd on March 20, 1912.

WYOMING.

CONVERSE COUNTY.

DOUGLAS. OUTCROP.

Sample.—Subbituminous coal; Glenrock field; analysis No. 11442 (p. 132).

Mine.—Outcrop in sec. 33, T. 40 N., R. 72 W., 50 miles north of Douglas, which is the nearest station on the Chicago & North Western Railway.

Coal bed.—Lower Burned. Tertiary age, Fort Union formation. Thickness, 6 feet 5 inches. Roof, carbonaceous shale; floor, carbonaceous clay.

The bed was measured and sampled by V. H. Barnett on September 25, 1910, as described below:

Section of coal bed in outcrop, 50 miles north of Douglas.

Laboratory No.....	11442
Roof, carbonaceous shale.....	<i>Ft. in.</i>
Coal with thin carbonaceous lenses.....	a 0 10
Coal.....	5 7
Floor, shale.....	
Thickness of bed.....	6 5
Thickness of coal sampled.....	5 7

a Not included in sample.

GLENROCK. COUNTRY BANK.

Sample.—Subbituminous coal; Glenrock field; analysis No. 11048 (p. 132).

Mine.—Country bank in sec. 5, T. 37 N., R. 75 W., 20 miles north of Glenrock, which is the nearest station on the Chicago & North Western Railway.

Coal bed.—Not named. Tertiary age, Fort Union formation. Thickness, 12 feet 8 inches; sandstone cap rock.

The bed was measured and sampled by C. H. Wegemann on September 29, 1910, as described below:

Section of coal bed in country bank, 20 miles north of Glenrock.

Laboratory No.....	11048
Roof, sandstone.....	<i>Ft. in.</i>
Coal.....	5 0
Coal, bony.....	a 1 2
Bone.....	a 0 2
Coal, clean.....	a 3 10
Coal with 2 bone partings.....	a 2 6
Floor, not stated.....	
Thickness of bed.....	12 8
Thickness of coal sampled.....	5 0

a Not included in sample.

Note.—The coal was mined intermittently from an open pit.

INEZ. DIAMOND MINE.

Sample.—Subbituminous coal; Glenrock field; analysis No. 14781 (p. 132).

Mine.—Diamond; Inez district; a slope mine in sec. 16, T. 33 N., R. 73 W., 1½ miles south of Inez, and of the Chicago & North Western Railway.

Coal bed.—Not named. Tertiary age, Fort Union formation. Thickness, 4½ to 5 feet; roof, fair shale; floor, good shale; dip, 17° NE.

The bed was measured and sampled on September 24, 1912, by V. H. Barnett, as described below:

Section of coal bed in Diamond mine.

Laboratory No.	14781
Roof, shale.	<i>Fl. in.</i>
Coal.	4 3
Clay.	0 1
Coal.	0 4
Floor, shale.	
Thickness of bed.	4 8
Thickness of coal sampled.	4 8

The sample was obtained at the face of an entry 450 feet from the mine mouth.

INEZ. INEZ MINE.

Sample.—Subbituminous coal; Glenrock field; analysis No. 14754 (p. 132).

Mine.—Inez; Inez district; a drift mine in the NW. $\frac{1}{4}$ sec. 16, T. 33 N., R. 72 W., 1 mile south of Inez and of the Chicago & North Western Railway.

Coal bed.—Not named. Tertiary age, Fort Union formation. Average thickness, about 5 feet; dip, 17° NE.

The bed was measured and sampled by F. A. Herald on September 19, 1912, as described below:

Section of coal bed in Inez mine.

Laboratory No.	14754
Roof, brown, carbonaceous shale.	<i>Fl. in.</i>
Coal.	5 3
Shale, carbonaceous, brown.	a 0 5
Shale, gray.	a 0 11
Shale, brown, carbonaceous.	a 0 6
Coal.	0 7
Floor, brown, carbonaceous shale.	
Thickness of bed.	7 8
Thickness of coal sampled.	5 10

a Not included in sample.

The sample was taken at the end of the entry, 620 feet northwest of the mouth of the slope.

LOST SPRING. FRED HAYNES PROSPECT.

Sample.—Subbituminous coal; Lost Spring field; analysis No. 10711 (p. 132).

Prospect.—Fred Haynes, a prospect opening in sec. 11, T. 32 N., R. 69 W., 9 miles west of Lost Spring, which is the nearest station on the Chicago & North Western Railway.

Coal bed.—Unnamed. Tertiary age, Fort Union formation. Thickness, 4 feet 2 inches. Roof, shale; floor, shale.

The coal bed was sampled at one point in the entry by D. E. Winchester on August 1, 1910. The sample was taken at the face of the main entry, about 50 feet from the mouth of the entry.

For a description of the geologic relations of this coal bed, see U. S. Geol. Survey Bull. 471, p. 491.

LOST SPRING. HARNEY CREEK MINE.

Sample.—Lignite verging on subbituminous coal; Lost Spring field; analysis No. 10911 (p. 132).

Mine.—Harney Creek, a drift mine in sec. 13, T. 34 N., R. 67 W., 17 miles northeast of Lost Spring, which is the nearest station on the Chicago & North Western Railway.

Coal bed.—Unnamed. Tertiary age, Fort Union formation. Thickness, 5 feet 6 inches. Roof, sandstone; floor, sandstone. The coal bed was sampled at one point in this mine by D. E. Winchester, September 10, 1910, as described below:

Section of coal bed in Harney Creek mine.

Laboratory No.....	10911
Roof, sandstone.....	<i>Ft. in.</i>
Coal.....	2 10
Shale, carbonaceous.....	a 0 1
Coal.....	2 1
Shale, carbonaceous.....	a 0 6
Floor, sandstone.....	
Thickness of bed.....	5 6
Thickness of coal sampled.....	4 11

a Not included in sample.

The above sample was taken at the end of the main entry, 80 feet from the main mouth.

For a description of the geologic relations of this coal bed, see U. S. Geol. Survey Bull. 471, p. 505.

LOST SPRING. ONYON MINE.

Sample.—Subbituminous coal; Lost Spring field; analysis No. 10740 (p. 133).

Mine.—Onyon, a drift mine in sec. 36, T. 33 N., R. 68 W., about 2 miles northwest of Lost Spring, which is the nearest station on the Chicago & North Western Railway.

Coal bed.—Unnamed. Tertiary age, Fort Union formation. Thickness, 5 feet 9 inches; roof, shale; floor, shale.

The bed was sampled at one point in the mine by D. E. Winchester on August 4, 1910. The sample was taken in room 15 off north entry 1, 1,800 feet from the mine mouth.

For a description of the geologic relations of this coal bed, see U. S. Geol. Survey Bull. 471, p. 495.

LOST SPRING. PROSPECT.

Sample.—Subbituminous coal; Lost Spring field; analysis No. 11447 (p. 133).

Prospect.—Prospect in sec. 8, T. 37 N., R. 68 W., 35 miles north of Lost Spring, which is the nearest station on the Chicago & North Western Railway.

Coal bed.—D. Tertiary age, Fort Union formation. Thickness, 4 feet 4 inches; cap, sandstone; floor, shale.

The bed was sampled by D. E. Winchester on October 21, 1910. The bed had been opened as a stripping pit. Some coal had been taken from the prospect during previous winters.

For a description of the geologic relations of this coal bed, see U. S. Geol. Survey Bull. 471, p. 513.

LOST SPRING. ROSIN MINE.

Sample.—Subbituminous coal; Lost Spring field; analysis No. 10775 (p. 133).

Mine.—Rosin, a drift mine in sec. 35, T. 34 N., R. 68 W., 8 miles north of Lost Spring, which is the nearest station on the Chicago & North Western Railway.

Coal bed.—Unnamed. Tertiary age, Fort Union formation. Thickness, 5 feet 1 inch; roof, shale; floor, shale.

The bed was measured and sampled by D. E. Winchester on August 17, 1910, as described below:

Section of coal bed in Rosin mine.

Laboratory No.....	10775
Roof, shale.....	<i>Ft. in.</i>
Coal, soft and bright.....	1 1
Shale, soft, carbonaceous.....	a 0 3
Coal, bright and hard.....	1 8
Shale, carbonaceous.....	a 0 1
Coal, bright and hard.....	2 0
Floor, shale.....	
Thickness of bed.....	5 1
Thickness of coal sampled.....	4 9

a Not included in sample.

The sample was taken at the face of left entry 1 off main entry, about 1,000 feet from the mine mouth.

For a description of the geologic relations of this coal bed, see U. S. Geol. Survey Bull. 471, p. 501.

LOST SPRING. SUNSET MINE.

Sample.—Subbituminous coal; Lost Spring field; analysis No. 10835 (p. 133).

Mine.—Sunset, a drift mine in sec. 35, T. 34 N., R. 68 W., 8 miles northwest of Lost Spring, which is the nearest station on the Chicago & North Western Railway.

Coal bed.—Unnamed. Tertiary age, Fort Union formation. Average thickness about 5 feet; roof, bony coal; floor, shale.

The coal bed was sampled by D. E. Winchester August 20, 1910, as described below:

Section of coal bed in Sunset mine.

Laboratory No.....	10835
Roof, bony coal.....	<i>Ft. in.</i>
Coal.....	0 4
Bony coal.....	a 1 4
Coal.....	0 6
Bony coal.....	a 0 $\frac{1}{2}$
Coal.....	0 7
Shale.....	a 0 3
Coal.....	2 3
Floor, shale.....	
Thickness of bed.....	5 3 $\frac{1}{2}$
Thickness of coal sampled.....	3 8

a Not included in sample.

This sample was taken at the face of the main entry, 500 feet from the mouth.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 471, p. 502.

CROOK COUNTY.

SUNDANCE. BELSHE MINE.

Sample.—Bituminous coal; Sundance field; analysis Nos. 15713, 15714, and 15715 (p. 133).

Mine.—Belshe; SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 24, T. 51 N., R. 64 W., 7 $\frac{1}{2}$ miles west of Sundance.

Coal bed.—No name. Lower Cretaceous age, Lakota formation. The bed is nearly horizontal and is variable in thickness and character. Both roof and floor are shale.

The bed was measured and sampled by M. W. Ball on January 2 and 3, 1913, as described below:

Sections of coal bed in Belshe mine.

Section.....	A	B	C	D
Laboratory No.....	15713		{ 15714 15715 }	
Roof, section A, black, carbonaceous shale with some coal; section B, black, "slaty" shale; section C, dark-gray shale, "slaty" immediately above coal.				
Coal, somewhat dirty, pyritiferous.....	<i>Ft. in.</i> 0 2	<i>Ft. in.</i> 0 6½	<i>Ft. in.</i> 0 2	<i>Ft. in.</i> 0 2
Coal, bright, clean.....	0 3¾	0 ½	0 11¾	0 2
Coal, rather dull, but clean.....	0 2	0 ½	0 1	0 2
Coal and pyrite.....	1 1	0 5½	0 7	3 2
Coal, slightly dull, with half inch streaks of lustrous coal.....	2 2	0 3½	0 6	0 2½
Coal, bright, with a few sulphurous streaks.....	a 0 2½	0 7½	0 3	0 7
Coal, dull.....	1 1	0 4	0 6	0 13½
Coal, bright.....	2 2	0 3	0 6	0 13½
Coal, moderately bright, rather hard.....	a 0 2½	0 4	0 6	0 13½
Splint and good coal, intermixed.....	1 0	0 3½	0 6	0 13½
Coal, rather dull.....	1 0	0 3½	0 6	0 13½
Coal, bright.....	1 0	0 3½	0 6	0 13½
Coal, rather dull and hard.....	1 0	0 3½	0 6	0 13½
Coal, good.....	1 0	0 3½	0 6	0 13½
Splint.....	1 0	0 3½	0 6	0 13½
Coal, moderately bright, with a little pyrite.....	1 0	0 3½	0 6	0 13½
Coal.....	1 0	0 3½	0 6	0 13½
Splint.....	1 0	0 3½	0 6	0 13½
Coal, bright.....	1 0	0 3½	0 6	0 13½
Coal, somewhat dull.....	1 0	0 3½	0 6	0 13½
Coal.....	1 0	0 3½	0 6	0 13½
Floor, section A, black shale; section B, "slaty" shale, with some coal; section C, "slaty" shale; section D, dark-gray shale.				
Thickness of bed.....	5 3½	4 10½	4 3½	4 6½
Thickness of coal sampled.....	4 10¾	4 10½	(c)	4 6½

a Not included in sample.

b Not included in sample 15714 but included in sample 15715.

c Sample 15714, 3 feet 5½ inches; sample 15715, 4 feet 3½ inches.

Section A (sample No. 15713) was taken at end of room turned east from back entry, 275 feet from mouth of mine.

Section B was taken at the end of the back entry.

Section C (samples Nos. 15714 and 15715) was taken in the last crosscut, 48 feet from the front entry.

Section D was taken at the end of the front entry.

FREMONT COUNTY.**HUDSON. HICKEY MINE.**

Sample.—Subbituminous coal; Hudson field of the Wind River region; analysis No. 17247 (p. 133).

Mine.—Hickey, a slope mine in sec. 11, T. 1 S., R. 2 E., 1 mile west of Hudson and one-fourth of a mile from the main line of the Chicago & North Western Railway.

Coal bed.—Unnamed. Cretaceous age, Mesaverde formation. Average thickness about 3 feet 8 inches; dip 13° E., 15° N. Faults, rolls, and horsebacks are uncommon. Roof, hard gray shale, above which is sandstone cap rock; floor, hard smooth shale; particles of the roof and floor do not get mixed with the coal in mining. The cover at the point where sample was taken is about 100 feet.

The coal bed was measured and sampled by J. C. Roberts on May 16, 1913. The sample included a 3½ foot cut of coal. The roof was shale, over which was sandstone; the floor was shale.

The sample was taken in room 3, off the south entry, 300 feet from the mouth of the mine.

Notes.—The Hickey mine is opened by a slope and the coal is mined by the room-and-pillar system. The coal was undercut by hand and broken down with black blasting powder. The coal cuttings were loaded with the coal. The screening equipment consisted of bar screens 12 feet long with 1½-inch and ½-inch openings. No men were

employed to pick shale out of the cars at the tippie. Eight men were employed at this mine.

For a description of the geologic relation of this bed see U. S. Geol. Survey Bull. 471, p. 545.

HUDSON. INDIAN MINE.

Sample.—Subbituminous coal; Hudson field; analyses Nos. 10838, 10839, 10840, 10841, 10842, 10843, 13178, and 13179 (p. 133).

Mine.—Indian; slope mine near Hudson, in the NE. $\frac{1}{4}$ sec. 2, T. 2 S., R. 2 E., in the Shoshone Indian Reservation, on a spur of the Wyoming & North Western Railway.

Coal bed.—The bed has not been designated by name, because of the lenticular nature of the beds in this region. Cretaceous age; Mesaverde formation. Thickness in the mine, variable; dip, 13° S. where sample 13178 was taken, and 18° S. where sample 13179 was taken.

The bed was measured and sampled at five points on September 3, 1910, by H. M. Wolfin, and at two points on December 11, 1911, by Max A. Pishel, as shown below:

Sections of coal bed in Indian mine.

Section.....	A	B	C	D	E
Laboratory No.....	10838	10839	10840	10841	10843
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
"Draw slate".....	.. ..	a0 10	a0 8	a0 8	.. ..
Clean coal.....	7 7 $\frac{1}{2}$	3 10	.. ..	3 1 $\frac{1}{2}$	.. ..
Slaty coal.....	.. ..	a0 6 $\frac{1}{2}$	.. ..	.. ..	.. ..
Bony coal.....	.. ..	.. ..	0 7	0 2 $\frac{1}{2}$	.. ..
Clean coal.....	.. ..	2 5	6 7	3 2	7 6
Floor, clay.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	7 7 $\frac{1}{2}$	7 7 $\frac{1}{2}$	7 10	7 2	7 6
Thickness of coal sampled.....	7 7 $\frac{1}{2}$	6 3	7 2	6 6	7 6

Section.....	F	G
Laboratory No.....	13178	13179
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 6	.. ..
Coal, with bony streaks.....	.. ..	0 10
Bone.....	a0 4	a0 4
Coal.....	.. ..	2 0
Shale, bony.....	a1 2	a1 0
Coal.....	1 6	0 8
Bone.....	a0 4	a0 2
Shale, bony.....	a1 2	.. ..
Coal.....	0 6	2 0
Floor, sandstone.....	.. ..	.. ..
Thickness of bed.....	6 6	7 0
Thickness of coal sampled.....	3 6	5 6

a Not included in sample.

Section A (sample 10838) was measured at the face of room 17, off the 00 entry.

Section B (sample 10839) was measured at the face of west entry 4.

Section C (sample 10840) was measured in a room (about No. 30), off west entry 2.

Section D (sample 10841) was measured at the face of room 4, off east entry 3.

Section E (sample 10843) was measured at the face of room 14 $\frac{1}{2}$, off west entry 2.

Section F (sample 13178) was measured in the fifth west back entry, one-fourth of a mile southwest of the mine mouth.

Section G (sample 13179) was taken in the main entry, 900 feet from the mine mouth.

A composite sample was made by mixing samples 10838, 10839, 10840, and 10841. The results of an ultimate analysis of this sample are given under laboratory No. 10842.

Notes.—At the time of sampling in 1911 the mine had been abandoned several months and a number of men were engaged in removing the hoisting engine. It seemed probable that in the future the mine would be worked on a small scale, as there was still considerable coal left in the mine as pillars. The probable lifetime of the mine was 10 years.

HUDSON. MITCHELL MINE.

Sample.—Subbituminous coal; Hudson field; analysis No. 17248 (p. 133).

Mine.—Mitchell, a slope mine in the Shoshone Indian Reservation, in the SW. $\frac{1}{4}$ sec. 22, T. 1 S., R. 2 E., 5 miles from Hudson and $3\frac{1}{2}$ miles from the Indian mine spur off the Chicago & North Western Railway.

Coal bed.—The bed has not been designated by name, chiefly because most of the beds in this region are lenticular. Cretaceous age, Mesaverde formation. Average thickness, 3 feet; dip, 20° S. 40° E. No cleats, rolls, or horsebacks have been encountered. Roof, excellent shale, above which is sandstone; floor, hard, smooth shale. The cover at the point where the sample was taken is about 100 feet thick.

The coal bed was measured and sampled at one point in the mine by J. C. Roberts, on May 16, 1913, as described below:

Section of coal bed in Mitchell mine.

Laboratory No.	17248
Roof, sandstone over shale.	<i>Ft. in.</i>
Coal.	1 2
Shale parting.	a 0 $1\frac{1}{2}$
Coal.	2 $\frac{1}{2}$
Floor, shale.	
Thickness of bed.	3 4
Thickness of coal sampled.	3 $2\frac{1}{2}$

a Not included in sample.

The sample was taken in the last room off the main slope, 40 feet from the slope and 500 feet from the mouth of the slope.

Notes.—The Mitchell mine is opened by a slope which is 5,050 feet above sea level. Although the long-wall method of mining was started, the workings at the time of sampling consisted mostly of rooms and gangways. The screening plant consisted of bar screens with 1-inch openings. There were no railway connections and the coal was transported by wagons. The mine was operated only when the operator had an order for coal for local consumption. All workings were advance.

HUDSON. PROPOSIA MINE.

Sample.—Lignite; analyses Nos. 17244, 17245, and 17246 (p. 133).

Mine.—Proposia, a slope mine 4 miles from Hudson on a spur of the Chicago & North Western Railway.

Lignite bed.—Lander. Cretaceous age, Mesaverde formation. Average thickness, 12 feet, ranging from 8 to 17 feet; dip, 14° N. 17° E. There are no cleats, faults, rolls, or horsebacks in the bed. Roof, shale with a sandstone cap rock; floor, hard smooth shale. Particles of the roof and floor do not mix with the coal in mining. The roof at the points where the samples were taken varies from 100 to 300 feet in thickness.

The lignite bed was measured and sampled at two points by J. C. Roberts on May 18, 1913, as described below:

Sections of lignite bed in Proposia mine.

Section.	A	B
Laboratory No.	17244	17245
Roof, shale under sandstone.	<i>Ft. in.</i>	<i>Ft. in.</i>
Clean coal.	a 7 6	.. ..
Do.	9 6	8 0
Floor, shale.		
Thickness of bed.	17 0	8 0
Thickness of coal sampled.	9 6	8 0

a Not included in sample.

Section A (sample 17244) was measured at the face of the second north entry, 1,800 feet from the mine mouth.

Section B (sample 17245) was measured at the face of the fifth south entry, 1,200 feet from the mine mouth.

A composite sample was made by mixing samples 17244 and 17245. The results of an ultimate analysis of this sample are given under laboratory No. 17246.

Notes.—The Proposia mine is opened by a slope. The coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut by hand and shot down with FF black blasting powder. The cuttings were loaded with the coal. None of the coal was shipped as run-of-mine. The screening equipment consisted of shaking screens 32 feet long by 8 feet wide; diameter of holes $\frac{1}{2}$, 2, 4, 5, 6, and 8 inches. Twenty-five per cent of the coal was lump; 30 per cent grate; 33 per cent nut, and 12 per cent slack. One picker was employed on the screens. The lump coal was large and had an excellent appearance on the cars. There were three loading tracks with a capacity for 50 empty cars and 50 loaded cars. There was approximately 600 acres of unmined coal to be taken out. The mine had an estimated life of 10 years. About 75 per cent of the future tonnage was to be derived from advance work and 25 per cent from pillars. The daily output at the time of sampling (May, 1913) was 1,100 tons, with a maximum day's run of 1,300 tons.

HOT SPRINGS COUNTY.

CROSBY. BIG HORN MINE.

Sample.—Subbituminous coal; analyses Nos. 15201 to 15212, 15214 to 15219, 15234 to 15237 (pp. 134–136).

Mine.—Big Horn, a slope mine at Crosby, 2 miles from Kirby, on the Chicago, Burlington & Quincy Railroad.

Coal bed.—Gébo. Cretaceous age, Laramie formation. Thickness of coal, 5 feet 6 inches to 8 feet 6 inches, not including the top coal, which is about 2½ feet thick and is left up for roof; dip, 17° N. 15° E. No faults, rolls, or horsebacks are encountered. Roof, clay and shale with a sandstone cap rock; floor smooth, medium-hard, shaly clay. Neither roof nor floor particles mixed with the coal in mining. Machine cuttings were loaded with the coal. The cover at the points where the samples were taken varies from 85 to 300 feet in thickness.

The coal bed was measured and sampled at five points in the mine and four samples of slack coal were taken, one in the mine and three from wagons, by O. C. Bradley, December 6 to 17, 1912, as described below:

Sections of coal bed in Big Horn mine.

Section.....	A	B	C	D	E
Laboratory No.....	15201 15202	15209 15210	15214 15215	15216 15217	15218 15219
Roof, clay and shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	.. ..	1 7	.. ..	.. ..	.. ..
Bony coal.....	.. ..	0 1	.. ..	.. ..	.. ..
Coal.....	7 6	1 0	8 1	2 4	5 3
Bony coal.....	.. ..	a 0 3	.. ..	a 0 3	.. ..
Coal.....	.. ..	5 6	.. ..	5 11	.. ..
Floor, underclay.					
Thickness of bed.....	7 6	8 5	8 1	8 6	5 3
Thickness of bed sampled.....	7 6	8 2	8 1	8 3	5 3

a Not included in sample.

Section A (duplicate samples 15201 and 15202) was measured on the east side of room 5, off butt entry 3 off west entry 1.

Section B (duplicate samples 15209 and 15210) was cut from east side of room 5, 50 feet from second butt dip entry off west entry 2.

Section C (duplicate samples 15214 and 15215) was cut from a pillar between rooms 6 and 7, off butt entry 2 off west entry 1.

Section D (duplicate samples 15216 and 15217) was cut from the face of room 6, off first dip butt entry off west entry 2.

Section E (duplicate samples 15218 and 15219) was cut from the face of room 9, off east entry 2, 45 feet from the entry.

A composite sample was made by mixing samples 15205, 15207, and 15211. The results of an ultimate analysis of this sample are shown under laboratory No. 15234.

A composite sample was made by mixing samples 15206, 15208, and 15212. The results of an ultimate analysis of this sample are shown under laboratory No. 15235.

A composite sample was made by mixing samples 15201, 15210, 15216, and 15218. The results of an ultimate analysis of this sample are shown under laboratory No. 15236.

A composite sample was made by mixing samples 15202, 15209, 15217, and 15219. The results of an ultimate analysis of this sample are shown under laboratory No. 15237.

Duplicate samples 15203 and 15204 represent slack coal taken from the mine.

Duplicate samples 15205 and 15206 represent slack from 17 wagonloads averaging 3,400 pounds each.

Duplicate samples 15207 and 15208 represent slack coal taken from 20 wagon-loads averaging 3,400 pounds each.

Duplicate samples 15211 and 15212 represent slack coal taken from 18 wagon-loads averaging 3,400 pounds each.

Notes.—The Big Horn mine is opened by a slope. The coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut by three electric coal-cutting machines and four air-punching machines. It was shot down with black blasting powder. Twenty-six per cent of the output passed through the screens. Grades of coal produced were: Lump coal, that passing 3, 4, and 8 inch openings; egg nut, that passing 4-inch to 1½-inch openings; nut, that passing 3-inch to 1½ inch openings; pea, that passing 1½-inch to ¾-inch openings. About 70 per cent of the coal was shipped under the first three classifications. There was little demand for the pea coal and the excess was thrown in with the slack and run out to the dump, except a small amount burned in the company's boilers. The lumps were large and had a good appearance. There were four loading tracks with a capacity of 15 empty and 15 loaded cars. There was approximately 490 acres to be taken out from the opening. The daily average output was 800 tons, with a maximum day's run of 815 tons.

KIRBY. GEBO MINE.

Sample.—Subbituminous coal; Bighorn Basin field; analyses Nos. 15277, 15278, 15279, 15280, 15281, 15282, 15283, 15342, 15343, 15344, 15345, 15346, 15347, 15348, 15349, 15475, 15482, 15687, and 16102 (pp. 136, 137).

Mine.—Gebo, a slope mine 2 miles southwest of Kirby in the S. ½ sec. 11, T. 44 N., R. 95 W., on a spur of the Chicago, Burlington & Quincy Railroad.

Coal bed.—Gebo. Cretaceous age, Eagle sandstone. Average thickness 10 feet 8 inches, dip 20½° N. 24° E.; cleat N. 57° E. No faults, rolls or horsebacks are encountered. Roof, clay and shale, with a sandstone cap rock; floor, hard and smooth sandstone. Particles of the roof and floor seldom mix with the coal in mining. Machine cuttings were loaded with the coal. The cover at the points where the samples were taken varies from 100 to 410 feet in thickness.

The coal bed was measured and sampled at 10 points in the mine, and 12 samples of slack were taken as it was being loaded on the car by O. U. Bradley, December 13 to 27, 1912, and 2 samples were taken from the cars of slack at Pittsburgh, Pa., by E. R. Linkenhoker on January 15 and 31, 1913, as described below:

Section of coal bed in Gebo mine.

Section.....	A
Laboratory No.....	15277
Roof, top coal, clay, and shale.....	Fl. in.
Clean coal.....	7 2
Coal, slightly bony.....	0 2
Coal.....	0 6
Floor, clay.....	
Thickness of bed.....	7 10
Thickness of coal sampled.....	7 10

Section A (sample 15277) was measured at the face of the fourth east entry, 225 feet from the second butt entry.

Sections B, C, D, E, F, G, H, I, and J were cut as described below. Sections B to E had a roof of top coal, clay, and shale, and a floor of clay; sections F to J had a roof of top coal, clay, "slate," and sandstone, and a floor of clay.

Section B (sample 15278) represented an 8-foot 9-inch cut of coal. It was measured at the face of room 8 east, second butt entry off the fifth entry.

Section C (sample 15279) represented a 9-foot 8-inch cut of coal. It was measured at the face of room 7 east, off first butt entry off the fifth level.

Section D (sample 15280) represented a 9-foot 2-inch cut of coal. It was measured at the face of the third east entry, 400 feet from the second butt entry.

Section E (sample 15281) represented a 7-foot 11-inch cut of coal. It was measured at the face of the third west entry, 300 feet from the main slope.

Section F (sample 15282) represented a 6-foot 9-inch cut of coal. It was measured on a pillar between room 1 west and the back entry off second level.

Section G (duplicate samples 15342 and 15343) represented a 5-foot 9-inch cut of coal. It was measured on a pillar between the second west entry and the back entry, 375 feet beyond the third butt entry, 1,750 feet from main slope.

Section H (duplicate samples 15344 and 15345) represented a 6-foot 1-inch cut of coal. It was measured on a pillar between rooms 1 and 2 west, off the first butt entry off the second east entry, about 400 feet from main slope.

Section I (duplicate samples 15346 and 15347) represented a 6-foot 5-inch cut of coal. It was measured on a pillar between pitch rooms 10 and 11, off the first west entry.

Section J (duplicate samples 15348 and 15349) represented a 6-foot 7-inch cut of coal. It was measured near the face on a pillar between the first west entry and the back entry, 2,100 feet from the slope.

A composite sample was made by mixing samples 15277, 15278, 15279, and 15280. The results of ultimate analysis of this sample are shown under laboratory No. 15283.

A composite sample was made by mixing six separate samples taken from the slack as it was being loaded into the cars for shipment. The results of an ultimate analysis of this sample are given under laboratory No. 15475.

A composite sample was made by mixing six samples taken from the slack as it was being loaded into the cars for shipment. The results of an ultimate analysis of this sample are given under laboratory No. 15482.

Samples were collected from each of two cars of slack shipped to Bureau of Mines, Pittsburgh, Pa., for a test as to most efficient utilization. For the results of analysis, see laboratory Nos. 15687 and 16102.

Notes.—The Gebo mine is opened by a drift. The coal is mined by the room-and-pillar system. At the time of sampling it was undercut by electric chain machines and compressed-air punching machines and was broken down with black blasting powder. The machine cuttings were loaded out with the coal. About 12 per cent of the coal was shipped as run-of-mine. The tippie was equipped with a shaking screen 42 by 7 feet, 15 feet having 1-inch holes, 4 feet, 1½-inch holes, 4 feet, 2½-inch holes, 4 feet, 5-inch holes, 4 feet, 8-inch holes, and a ¾-inch screen for slack. No men were employed on the cars or belts to pick shale from the coal. The lumps being loaded were large and had a good appearance. There were four loading tracks with a capacity of 75 empty cars and 75 loaded cars. Approximately 1,000 acres of coal remained to be taken out. The mine was expected to have a lifetime of 50 years; future tonnage was to be derived almost wholly from advance workings. The daily output was 750 tons, with a maximum day's run of 1,026 tons. The daily output was to be increased to 1,000 tons or more.

MEETEETSE. DICKIE No. 1 PROSPECT.

Sample.—Subbituminous coal; Bighorn Basin field; analysis No. 14679 (p. 137).

Mine.—Dickie No. 1; a prospect drift on the northwest side of Grass Creek Basin, in sec. 2, T. 46 N., R. 99 W., 18 miles southeast of Meeteetse.

Coal bed.—No name. Cretaceous age, Gebo formation (Eagle sandstone). Dip, 16° N.

The bed was measured and sampled by D. F. Hewett, August 23, 1912, as described below:

Section of coal bed in Dickie No. 1 prospect.

Laboratory No.	14679
Roof, brown shale.	<i>Ft. in.</i>
Coal.	0 1
Shale.	0 1½
Coal.	0 5
Coal, bony.	0 2
Coal.	2 6
Shale.	0 ½
Coal.	0 9
Floor, shale.	
Thickness of bed.	4 0
Thickness of coal sampled.	4 0

The sample was taken from the east rib of the western of two short drifts at a point 25 feet from the mouth. As the mine had been idle since 1910, the coal was weathered.

MEETEETSE. MAYFIELD No. 2 PROSPECT.

Sample.—Subbituminous coal; Bighorn Basin field; analysis No. 14756 (p. 137).

Mine.—Mayfield No. 2. A prospect 2 miles southwest of Grass Creek Basin, in E. ½ sec. 26, T. 46 N., R. 99 W., 19 miles southeast of Meeteetse.

Coal bed.—No name. Tertiary age, Fort Union formation. Dip 5° SE.

The bed was measured and sampled by D. F. Hewett on August 24, 1912, as described below:

Section of coal bed in Mayfield No. 2 prospect.

Laboratory No.	14756
Roof, gray shale.	<i>Ft. in.</i>
Coal.	^a 24 0
Coal, bench sampled and mined.	6 0
Floor, sandstone.	
Thickness of bed.	30 0
Thickness of coal sampled.	6 0

^a Not included in sample.

The sample was taken at the face of the new drift, 30 feet from the mouth.

Notes.—This prospect was opened in 1911 on the west side of a ravine, 500 feet southwest of an old opening on the east side, where sample No. 5770 was collected by E. G. Woodruff in 1907.

Only the lower part of the bed was mined. The mine was operated only intermittently, but the sample represented unweathered coal.

JOHNSON COUNTY.

BUFFALO. PROSPECT.

Sample.—Subbituminous coal; Sussex field (Basin No. 2); analysis No. 10683 (p. 137).

Mine.—This sample was taken from a small prospect which was being operated by ranchers in sec. 17, T. 47 N., R. 81 W. The mine is 18 miles southeast of Buffalo and about 50 miles south of Regis, which is the nearest station on the Chicago, Burlington & Quincy Railroad

Coal bed.—B. Tertiary age, Fort Union formation. Thickness, about 11 feet; sandstone capping.

The bed was measured and sampled by C. H. Wegemann on July 20, 1910, as described below:

Section of coal bed in prospect, 18 miles southeast of Buffalo.

Laboratory No.....	10683
Roof, white sandstone.....	<i>Ft. in.</i>
Coal.....	a 0 6
Shale, gray.....	a 2 0
Coal.....	a 2 5
Shale.....	a 0 1
Coal.....	3 4
Shale.....	a 0 $\frac{1}{2}$
Coal.....	a 2 5
Floor, not stated.....	
Thickness of bed.....	10 9 $\frac{1}{2}$
Thickness of coal sampled.....	3 4

a Not included in sample.

For a description of the geologic relations of this bed, see U. S. Geol. Survey Bull. 471, p. 454.

CASPER. PROSPECT.

Sample.—Subbituminous coal; Sussex field (Basin No. 3); analysis No. 10728 (p. 137).

Mine.—Prospect in sec. 23, T. 44 N., R. 81 W., about 75 miles north of Casper, which is the nearest station on the Chicago & North Western Railway.

Coal bed.—Unnamed. Tertiary age, Fort Union formation. Thickness, 6 feet 3 inches; cap rock, sandstone.

The coal bed was sampled by C. H. Wegemann on July 29, 1910, as described below:

Section of coal bed in prospect, 75 miles north of Casper.

Laboratory No.....	10728
Roof, sandstone.....	<i>Ft. in.</i>
Shale.....	a 0 6
Coal.....	3 7
Coal, bony.....	a 0 2
Coal.....	a 2 0
Floor, not stated.....	
Thickness of bed.....	6 3
Thickness of coal sampled.....	3 7

a Not included in sample.

Note.—Coal had been mined at this prospect to some extent for local use.

For a description of the geologic relations of this coal bed, see U. S. Geol. Survey Bull. 471, p. 458.

CASPER. PROSPECT.

Sample.—Subbituminous coal; Sussex field (Basin No. 4); analysis No. 10804 (p. 137).

Mine.—Prospect in sec. 36, T. 43 N., R. 79 W., about 60 miles north of Casper, which is the nearest station on the Chicago & North Western Railway.

Coal bed.—Unnamed. Tertiary age, Fort Union formation. Thickness, about 14 feet. It was sampled by C. H. Wegemann, August 16, 1910, as described below:

Section of coal bed in prospect, about 60 miles north of Casper.

Laboratory No.	10804
Roof, not stated.	<i>Ft. in.</i>
Shale	a 0 6
Coal	a 0 8
Shale	a 1 2
Coal	2 5
Coal, bony	a 0 5
Coal	1 2
Shale	a 0 6
Coal	a 1 1
Shale	a 1 0
Coal	a 1 2
Coal, bony	a 0 7
Coal	a 2 3
Floor, not stated.	
Thickness of bed	12 11
Thickness of coal sampled	3 7

a Not included in sample.

For a description of the geologic relations of this bed, see U. S. Geol. Survey Bull. 471, p. 462.

CASPER. PUGGSLEY MINE.

Sample.—Subbituminous coal; Sussex field (Basin No. 4); analysis No. 10827 (p. 138).

Mine.—Puggsley, a mine in sec. 20, T. 42 N., R. 77 W., 65 miles north of Casper, which is the nearest station on the Chicago & North Western Railway.

Coal bed.—Unnamed. Tertiary age, Fort Union formation. Thickness, 20 feet 5 inches. It was sampled at one point in this mine by Carroll H. Wegemann, on August 26, 1910, as described below:

Section of coal bed in Puggsley mine.

Laboratory No.	10827
Roof, not stated.	<i>Ft. in.</i>
Coal	a 0 10
Bone	a 0 4
Coal	a 3 0
Shale and coal	a 1 10
Coal	5 0
Coal, bony	a 0 3
Coal	a 0 8
Bone	a 0 7
Coal	a 4 2
Shale	a 0 3
Coal	a 3 6
Floor, not stated.	
Thickness of bed	20 5
Thickness of coal sampled	5 0

a Not included in sample.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 471, 1912, p. 461.

CASPER. PROSPECT.

Sample.—Subbituminous coal; Sussex field; analysis No. 11059 (p. 138).

Mine.—Prospect in sec. 32, T. 41 N., R. 78 W., 50 miles north of Casper, which is the nearest station on the Chicago & North Western Railway.

Coal bed.—Unnamed. Tertiary age, Fort Union (?) formation. Bed. 3 feet 10 inches thick, with a sandstone cap rock 12 feet thick, and a sandstone floor. The coal bed was sampled by C. J. Hares on October 6, 1910, as described below:

Section of coal bed in prospect, 50 miles north of Casper.

Laboratory No.....	11059
Roof, sandstone.....	<i>Ft. in.</i>
Coal.....	2 2
Sandstone.....	a0 8
Shale.....	a1 0
Floor sandstone.....	
Thickness of bed.....	3 10
Thickness of coal sampled.....	2 2

a Not included in sample.

Note.—The coal had been mined to some extent for local use.

KAYCEE. ABANDONED MINE.

Sample.—Bituminous coal; Sussex field (Basin No. 3); analysis No. 10694 (p. 138).

Mine.—An abandoned mine in sec. 24, T. 44 N., R. 81 W., 6 miles northeast of Kaycee and about 50 miles north of Bucknum, which is the nearest station on the Chicago & North Western Railway.

Coal bed.—Unnamed. Cretaceous age, Fort Union formation.

The bed was sampled at one point in the mine by O. B. Hopkins. The sample represented the entire face section of the coal bed.

For a description of the geologic relations of this coal bed see U. S. Geol. Survey Bull. 471, 1912, p. 459.

NATRONA COUNTY

CASPER. RED ASH MINE.

Sample.—Subbituminous coal; Wind River field; analysis No. 10671 (p. 138).

Mine.—Red Ash, a drift mine in sec. 14, T. 31 N., R. 82 W., Platte River district, about 25 miles southwest of Casper, which is the nearest station on the Chicago & North Western Railway.

Coal bed.—Not named. Cretaceous age, Fort Union formation. Thickness, 6 feet 3 inches. The bed is overlain with 4 inches of carbonaceous shale capped by sandstone; floor, carbonaceous shale.

The bed was sampled at one point in the mine by D. E. Winchester on July 9, 1910. The sample was taken at the face of the second and last room off the main entry, about 300 feet from the mine mouth.

Note.—The mine had been worked periodically to supply local use, but was idle at the time of sampling.

PARK COUNTY.

CODY. MCGUFFEY MINE.

Sample.—Subbituminous coal; Bighorn Basin field; analysis No. 12886 (p. 138).

Mine.—McGuffey; a slope mine on the north side of Oregon Basin, in sec. 17, T. 52 N., R. 100 W., 9 miles southeast of Cody.

Coal bed.—Unnamed. Cretaceous age; Gebo formation (Eagle sandstone). Dip, 14° NE.

The bed was measured and sampled by D. F. Hewett on August 18, 1911, as shown below:

Section of coal bed in the McGuffey mine.

Laboratory No.	12886
Roof, blue shale.	<i>Ft. in.</i>
Coal.	0 5
Coal, high in pyrite.	0 1
Coal.	0 7
Shale.	a 0 5
Coal.	1 7
Floor, shale.	
Thickness of bed.	3 1
Thickness of coal sampled.	2 8

a Not included in sample.

The sample was taken from the east rib of a room 20 feet above entry 3, at a point 70 feet east of the slope. The coal was unweathered.

Note.—The mine had been opened in 1910 and operated throughout the year.

MEETEETSE. BLACK DIAMOND MINE.

Sample.—Subbituminous coal; Bighorn Basin field; analysis No. 12887 (p. 138).

Mine.—Black Diamond; a slope mine in sec. 21, T. 49 N., R. 100 W., 4 miles north of Meeteetse.

Coal bed.—No name. Tertiary age, Fort Union formation. Thickness, 42 inches; roof, sandstone overlain with shale; floor, shale; dip, 18° NE.

The bed was measured and sampled by D. F. Hewett on September 11, 1911. The sample represented 3½ feet of coal, including the entire bed.

The sample was taken from the breast of a room 30 feet above entry 6, at a point 200 feet west of the slope.

Note.—This is the same mine sampled by E. G. Woodruff in 1907 (No. 5768). Under No. 5768 the location is incorrectly given as sec. 28, T. 49 N., R. 100 W. The mine was operated throughout the year.

MEETEETSE. GREYBULL OR WILSON MINE.

Sample.—Subbituminous coal; Bighorn Basin field; analysis No. 12888 (p. 138).

Mine.—Greybull or Wilson; a slope mine in the SE. ¼ sec. 13, T. 48 N., R. 101 W., 3½ miles southwest of Meeteetse and 40 miles south of Cody.

Coal bed.—No name. Cretaceous age, Gebo formation (Eagle sandstone). Dip, 5° NE.; thickness, 5½ to 6 feet.

The bed was measured and sampled by D. F. Hewett on September 12, 1911, as shown below:

Section of coal bed in Greybull or Wilson mine.

Laboratory No.	12888
Roof, sandstone.	<i>Ft. in.</i>
Coal.	a 0 6
Shale.	a 0 3
Coal.	2 1
Shale.	a 0 4
Coal.	2 5
Floor, shale.	
Thickness of bed.	5 7
Thickness of coal sampled.	4 6

a Not included in sample.

The sample was taken from the face of a room 200 feet northwest of the slope, at a point 400 feet from the mine mouth.

Notes.—This mine lies on the north side of Greybull River and adjoins the Erskine mine, sampled by E. G. Woodruff in 1907 (sample No. 5769). The Erskine mine and the Wilson mine operate the same bed, though the coal sections in the respective mines differ considerably. The mine was operated throughout the year.

WILEY. EAGLE MINE.

Sample.—Subbituminous coal; Bighorn Basin field; analysis No. 12885 (p. 139).

Mine.—Eagle. A slope mine east of Oregon Basin, in the SW. $\frac{1}{4}$ sec. 2, T. 51 N. R. 100 W., 2 miles northeast of Wiley, 13 miles southeast of Cody.

Coal bed.—No name. Cretaceous age, Meeteetse formation. Dip, 34° E.

The bed was measured and sampled by D. F. Hewett on August 16, 1911, as shown below:

Section of coal bed in Eagle mine.

Laboratory No.	12885
Roof, soft gray shale.	<i>Ft. in.</i>
Coal.....	1 4
Coal, bony	1 0
Shale.....	a 0 1
Coal.....	0 11
Shale.....	a 0 2
Coal.....	2 2
Floor, brown shale.	
Thickness of bed.....	5 8
Thickness of coal sampled.....	5 5

a Not included in sample.

The sample was taken from the west rib of the north entry, 6 feet from the bottom of the shaft. The coal was unweathered.

Note.—The mine had been idle since 1910.

WILEY. EAST WILEY MINE.

Sample.—Subbituminous coal; Bighorn Basin field; analysis No. 12884 (p. 139).

Mine.—East Wiley, a slope mine on the east side of Oregon Basin, in the SE. $\frac{1}{4}$ sec. 10, T. 51 N., R. 100 W., 6 miles east of Wiley and 14 miles southeast of Cody.

Coal bed.—No name. Cretaceous age, Gebo (Eagle sandstone) formation. Dip, 22° E. Roof, shale; floor, brown shale on massive sandstone.

The bed was measured and sampled by D. F. Hewett on August 14, 1911, as shown below:

Section of coal bed in East Wiley mine.

Laboratory No.	12884
Roof, shale.	<i>Ft. in.</i>
Coal.....	1 6
Shale.....	a 0 5
Coal.....	2 1
Floor, brown shale on massive sandstone.	
Thickness of bed.....	4 0
Thickness of coal sampled.....	3 7

a Not included in sample.

The sample was taken from the south rib of the slope at a point 180 feet from the mouth. The coal was unweathered.

Notes.—This mine was sampled by E. G. Woodruff in 1907 (sample No. 5762). The several benches of the bed vary greatly in thickness in the workings, but the total thickness of the bed is nearly uniform. The mine was operated intermittently.

WILEY. WEST WILEY (THOMPSON) MINE.

Sample.—Subbituminous coal; Bighorn Basin field; analysis No. 12883 (p. 139).

Mine.—West Wiley. A drift mine on the southwest side of the Oregon Basin, in sec. 34, T. 51 N., R. 101 W., 4 miles southwest of Wiley and 15 miles southeast of Cody. Operated intermittently.

Coal bed.—No name. Cretaceous age; Gebo (Eagle sandstone) formation. Dip, 28° SW.

The bed was measured and sampled by D. F. Hewett, June 30, 1911, as shown below:

Section of coal bed in West Wiley mine.

Laboratory No.	12883
Roof, shale.	<i>Ft. in.</i>
Coal, bony.	a 0 9
Shale.	a 0 4
Coal, bony.	a 0 4
Coal.	1 7
Shale.	a 0 3
Coal.	1 8
Shale, black, soft.	a 0 4
Coal, extremely variable.	a 0 4
Floor, sandstone.	
Thickness of bed.	5 7
Thickness of coal sampled.	3 3

a Not included in sample.

The sample was taken from the face of a room 300 feet from the mouth of the drift at a point 40 feet below the surface. The coal was unweathered.

Notes.—This mine was sampled by E. G. Woodruff in 1907 (sample No. 5767), but at the time of sampling the slope had been abandoned and the coal was mined from a drift. The several benches of the bed vary greatly in thickness throughout the workings, the total thickness varying from 4 feet 4 inches to 6 feet.

SHERIDAN COUNTY.

ACME. ACME No. 1 MINE.

Sample.—Subbituminous coal, Sheridan field; analyses Nos. 10823, 10824, 10826, and 12687 (p. 139).

Mine.—Acme No. 1, a drift mine at Acme, in the SE. $\frac{1}{4}$ sec. 13, T. 57 N., R. 85 W., on the main line of the Chicago, Burlington & Quincy Railroad.

Coal bed.—Carney. Tertiary age, Fort Union formation. Average thickness, 16 feet; dip, 1° SE.; roof, soft shale or soapstone; floor, shaly clay, fairly hard.

The bed was measured and sampled at three points by H. M. Wolfen, on August 29, 1910, and at one point by O. B. Hopkins, September 30, 1911, as described below:

Sections of coal bed in Acme No. 1 mine.

Section.	A	B	C	D
Laboratory No.	10823	10824	10826	12687
Roof, shale.	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Dirty coal. ....	.. ..	.. ..	a 0 10	.. ..
Soft gray shale. ....	.. ..	.. ..	a 1 0	.. ..
Coal. ....	.. ..	.. ..	.. ..	a 4 0
Coal and shale. ....	.. ..	.. ..	a 0 2	.. ..
Shale. ....	.. ..	.. ..	.. ..	a 1 3
Coal. ....	.. ..	.. ..	7 7 $\frac{1}{2}$	8 0
Gray shale.	a 0 10	a 1 0	a 0 5	a 0 7
Bony coal. ....	.. ..	a 0 4	.. ..	.. ..
Bottom coal, clean.	6 2	6 10	a 7 0	a 7 0
Floor, clay. ....	.. ..	.. ..	.. ..	.. ..
Thickness of bed.	7 0	8 2	17 $\frac{1}{2}$	20 10
Thickness of coal sampled.	6 2	6 10	7 7 $\frac{1}{2}$	8 0

a Not included in sample.

Section A (sample 10823) was measured on the pillar of room 9 off east entry 5, off the main entry. The sample was from the bottom coal.

Section B (sample 10824) was measured on the pillar of room 1, off west entry 3, off the main north entry, and represented bottom coal.

Section C (sample 10826) was measured on the pillar near the face of west entry 3, off the main north entry; it represented top coal.

The point of measurement of section D was not recorded.

Notes.—The room-and-pillar system of mining was used. At the time of sampling black powder was used for breaking the coal when undercut and for brushing the top and taking up the bottom. None of the coal was shipped as run-of-mine. It was all passed over bar screens set 1½, 3, 4, and 5 inches apart. The screenings from the bar screens passed through revolving screens with openings of 1 and 2 inches. The coal was clean and free from rock but had a tendency to slack. There was only one loading track, with a capacity of 30 cars. The output of the mine was 350 tons per day.

ACME. ACME No. 2 MINE.

Sample.—Subbituminous coal; Sheridan field; analyses Nos. 10807, 10808, 10809, 10811, and 12683 (p. 139).

Mine.—Acme No. 2, a drift mine at Acme, in sec. 13, T. 57 N., R. 85 W., on the main line of the Chicago, Burlington & Quincy Railroad.

Coal beds.—Carney and Masters. Tertiary age, Fort Union formation. Total thickness of Carney bed, 8 feet; thickness of workable portion, 6 feet; dip, 1° southwest; thickness of Masters bed, 7 to 9 feet. Roof, Carney bed, soft shale above roof coal; followed by soft sandstone; Masters bed, shale. Floor, Carney bed, black shaly clay; Masters bed, shale.

The Carney bed was measured and sampled at four points in the mine by H. M. Wolfiin, on August 24, 1910, as described below:

Sections of Carney bed in Acme No. 2 mine.

Section.....	A 10807	B 10808	C 10809	D 10811
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Roof coal.....	2 10	2 8	2 6	2 8
Clean coal.....	1 4	1 4	1 4	1 2
Woody coal.....	2 2	2 2	2 3½	2 8½
Clean coal.....				
Floor, black shaly clay.....	6 4	6 2	6 1½	6 6½
Thickness of bed.....	6 4	6 2	6 1½	6 6½
Thickness of coal sampled.....				

Section A (sample 10807) was measured at the face of room 13 off south entry 2 off west entry 3.

Section B (sample 10808) was measured at the face of south entry 5 off west entry 3.

Section C (sample 10809) was measured at the face of room 1 off north entry 1 off west entry 5.

Section D (sample 10811) was measured on a pillar of west entry 1.

The Masters bed was measured and sampled on September 30, 1911, by O. B. Hopkins, as described below:

Section of Masters bed in Acme No. 2 mine.

Laboratory No.....	12683
Roof, shale.....	<i>Ft. in.</i>
Coal.....	a 1 6
Coal.....	7 0
Floor, shale.....	
Thickness of bed.....	8 6
Thickness of coal sampled.....	7 0

a Not included in sample.

Sample 12683 was taken 2,000 feet northeast of the mine mouth.

Notes.—The coal is subbituminous merging into lignite. About 48 per cent of the output was shipped as run-of-mine. About 10 per cent was disposed of as screen-

ings. The screening plant was the same one described under Acme No. 1 mine. The room-and-pillar system of mining was used; 60 per cent of the coal was produced from advance workings. The ultimate recovery was expected to be 90 per cent. Black powder was used for breaking down the coal, brushing the top, and taking up the bottom.

CARNEYVILLE. CARNEY MINES.

Samples.—Subbituminous coal, Sheridan field; analyses Nos. 12684, 15677, 15678, 15679, 15680, 15681, 15682, 15683, 15684, 15685, and 15686 (pp. 140, 141).

Mines.—Carney, two drift mines north of Carneyville, in secs. 16 and 17, T. 57 N., R. 84 W., on the Chicago, Burlington & Quincy Railroad.

Coal bed.—Known as the Carney. Tertiary age; Fort Union formation. Thickness, fairly uniform, ranging from 16 to 18 feet, 10 to 12 feet of which is mined. Dip, 1° to 2° SE. The coal is mined to a clay parting $1\frac{1}{2}$ to 6 inches thick; in some places it is rather soft and in falling becomes mixed with the coal. Above the parting is 4 to $4\frac{1}{2}$ feet of coal of good grade; it makes an excellent roof and no timbering is required in the rooms or entries. Above this roof coal there is 1 foot to 1 foot 2 inches of clay shale which falls easily. Floor, rather smooth, soft underclay. In places a streak of bony coal 2 to 6 inches thick appears at the bottom of the coal bed next to the underclay. Where this streak was present the undercutting was done above it. The cover ranges from 200 to 225 feet.

The bed was measured and sampled at one point by O. B. Hopkins, on October 4, 1911, as described below:

Section of coal bed in Carney mine.

Laboratory No.....	12684
Coal.....	<i>Fl. in.</i>
Shale.....	a 5 0
Coal.....	a 1 0
Thickness of bed.....	10 0
Thickness of coal sampled.....	16 0
	10 0

a Not included in sample.

The section (sample 12684) was measured 1,000 feet northwest of the mine mouth.

The coal bed was also measured and sampled at four points in No. 1 mine and five points in No. 2 mine by O. U. Bradley on January 1 to 9, 1913, as described below:

Section A (sample 15677) was measured at the face of room 10, off north entry 4, off east entry 2. The sample represented a 10-foot 6-inch cut of coal.

Section B (sample 15678) was measured 25 feet in room 9, north entry 2, off west entry 4. The sample represented an 11-foot 2-inch cut of coal.

Section C (sample 15679) was measured at the face of the main entry. The sample represented a 10-foot 10-inch cut of coal.

Section D (sample 15680) was measured at the face of room 12, off north entry 4, off west entry 3, 75 feet from north entry 4. The sample represented a 10-foot 1-inch cut of coal.

These samples were from No. 1 mine; those from No. 2 mine follow.

Section A (sample 15681) was measured at the face of room 5, off north entry 2, off west entry 2. The sample represented an 11-foot 10-inch cut of coal.

Section B (sample 15682) was measured 85 feet in room 16 at face, off north entry 3, off east entry 1. The sample represented an 11-foot 1-inch cut of coal.

Section C (sample 15683) was measured 125 feet in room 15 at face, off north entry 2, off east entry 2. The sample represented an 10-foot 11-inch cut of coal.

Section D (sample 15684) was measured at the face of the main north entry. The sample represented an 11-foot 7-inch cut of coal.

Section E (sample 15685) was measured 65 feet in room 9 at face, off north entry 4, off west entry 1. The sample represented a 10-foot 5-inch cut of coal.

A composite sample was made by mixing samples 15677, 15678, 15679, 15680, 15681, 15682, 15683, 15684, and 15685. The results of an ultimate analysis of this sample are given under laboratory No. 15686.

Notes.—The coal was mined by the panel method, room-and-pillar system. At the time of sampling the coal was undercut by chain breast machines in the bottom part of the bed and shot down with black powder. One wooden tippie was in constant use at the mines and a new steel tippie had been built as a reserve when heavy orders were received. About 22 per cent of the coal was shipped in run-of-mine form, and about 68 per cent passed through the screens. The wooden tippie had bar screens 7 feet long, 3½ feet wide, with 5½-inch spaces; shaker screen, 7½ feet by 8 feet, with holes 2½ inches in diameter, and a revolving screen 28 feet long divided into two sizes, as follows: 12 feet with 1-inch holes and 16 feet with ½-inch holes. No pickers were employed. The tippie was rather high, and the coal fell such a distance in screening that an unusually large percentage of fine coal was produced. All slack coal, which at times included all sizes below 1¼ inches, was loaded direct into box or flat cars, hauled out, and dumped. During certain months of the year, when demand for the fine coal was small, this waste amounted to 2,000 to 3,000 tons per month. The loaded lumps were medium large and had a good appearance on the cars. Three loading tracks were available, with a capacity of 160 loaded and 160 empty cars. About 1,800 acres remained to be mined. Average daily output, 1,800 tons, with a maximum day's run of 2,200 tons.

DIETZ. DIETZ NO. 4 MINE.

Sample.—Subbituminous coal; Powder River field; analyses Nos. 16221, 16222, 16223, 16224, 16225, 16226, 16227, 16228, 13498, 13499, 13537 (p. 141).

Mine.—Dietz No. 4, a slope mine in sec. 34, T. 57 N., R. 84 W., at Dietz, on the main line of the Chicago, Burlington & Quincy Railroad.

Coal bed.—Dietz No. 2 (?). Tertiary age, Fort Union formation. Average thickness, 8 feet. The bed is practically horizontal, and very few faults, rolls, or horsebacks are encountered. Roof, bony coal about 6 inches thick, overlain by gray shale. The floor is a shaly clay, and in many places is wet and soft, and particles of it mix with the coal in loading. The cover at the points where the samples were taken varies from 100 to 220 feet in thickness.

The coal bed was measured and sampled at two points in the mine by H. M. Wolfen, January 12, 1912, as described below:

Sections of coal bed in Dietz No. 4 mine.

Section.....	A	B
Laboratory No.....	13498	13499
Roof, coal and shale.	<i>Ft. in.</i>	<i>Ft. in.</i>
Clean coal.....	2 10	3 9
Bony coal.....	0 1	0 2
Clean coal.....	5 6½	3 9
Floor, shaly clay.		
Thickness of coal mined.....	8 5½	7 8
Thickness of bed sampled.....	8 5½	7 8

Section A (sample 13498) was measured at the face of room 3, off west entry 4.

Section B (sample 13499) was measured at the face of room 1, off west entry 12, off the main north entry.

A composite sample was made by mixing face samples 13498 and 13499; the results of an ultimate analysis of this sample are shown under laboratory No. 13537.

The bed was also measured and sampled at seven points in the mine by O. U. Bradley, January 31 to February 3, 1913, as described below:

Section A (sample 16221) was measured at the face of room 9, off west entry 6 off north entry 6. The sample represented a 7½-foot cut of coal, the thickness of the coal mined.

Section B (sample 16222) was measured at the face of room 2, off west entry 12 off north entry 4. The sample represented a 7-foot 7-inch cut of coal, the thickness of the coal mined.

Section C (sample 16223) was measured at the face of north entry 4 off west entry 4. The sample represented a 7¼-foot cut of coal, the thickness of the coal mined.

Section D (sample 16224) was measured at the face of room 10, off east entry 5 off the main north entry. The sample represented a 7-foot 5-inch cut of coal, the thickness of the coal mined.

Section E (sample 16225) was measured at the face of the main north entry. The sample represented a 7-foot 1-inch cut of coal, the thickness of the coal mined.

Section F (sample 16226) was measured on pillar in room 9, off east entry 14. The sample represented an 8-foot 7-inch cut of coal, the thickness of the coal mined.

Section G (sample 16227) was measured at the face of main entry, 150 feet from opening. The sample represented a 6-foot 1-inch cut of coal, the thickness of the coal mined.

A composite sample was made by mixing the pillar and face samples 16221 to 16227, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 16228.

Notes.—The Dietz No. 4 mine is opened by a slope. At the time of sampling the coal was mined by the double-entry room-and-pillar system. Part of the coal was undercut by hand and part was shot off the solid. The cuttings from mining were loaded with the coal. The coal was shot down with black blasting powder. The screening plant consisted of shaker screens as follows: Screen 6 by 8 feet with 7-inch holes; screens 2½ by 8 feet with 2½-inch holes, 3½ by 8 feet with 2-inch holes; 6 by 8 feet with 1¼-inch holes; and 25 by 8 feet with ¾-inch holes. None of the coal was shipped in run-of-mine form. No pickers were employed. The lump coal had a firm and fairly clean appearance on the cars and was medium large. The coal screenings were fairly clean and well sized. There were five loading tracks with a capacity of 48 empty cars and 48 or more loaded cars. The mine had a probable lifetime of about six years; the tonnage was to be derived from both advance and pillar work. The daily output of the mine was 1,000 tons, with a maximum day's run of 1,500 tons; 1,000 tons was about the capacity of the plant.

KOOI. HUGHEY PROSPECT.

Sample.—Subbituminous coal; Sheridan field; analysis No. 12642 (p. 141).

Prospect.—Hughey; sec. 27, T. 57 N., R. 85 W., 1½ miles south of Kooi.

Coal bed.—Monarch (?). Tertiary age, Fort Union formation. Roof and floor, shale.

The bed was measured and sampled by O. B. Hopkins on September 11, 1911. The sample represented a 4-foot cut of coal, the thickness of the bed.

KOOI. KOOI MINE.

Sample.—Subbituminous coal; Sheridan field; analyses Nos. 10818, 10819, 10820, 10821, 12641, 16060, 16061, 16062, 16063, 16064, 16065, 16066, and 16067 (pp. 141, 142).

Mine.—Kooi; a slope mine in sec. 23, T. 57 N., R. 85 W.; at Kooi on a branch of the Chicago, Burlington & Quincy Railroad, about three-fourths of a mile from the main line.

Coal bed.—Known as the Monarch. Average thickness of the coal as mined, 8 feet 6 inches. The bed dips 1° S. 4° E. with a pronounced east-and-west cleat. The roof is coal of variable thickness; above the roof coal is a thick bed of alternate coal and

shale. Floor, hard clay, which becomes soft when wet. The cover, at the points where the samples were taken, ranges from 50 to 210 feet.

The bed was measured and sampled at four points by H. M. Wolfin, on August 26, 1910, and at one point by O. B. Hopkins, on September 11, 1911, as described below:

Sections of coal bed in Kooi mine.

Section.....	A	B	C	D	E
Laboratory No.....	10818	10819	10820	10821	12641
Roof, coal and shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Top coal.....	.. ..	a 20 0	a 25 0	a 25 0	.. ..
Shaly coal.....	a 0 4	a 0 3	a 0 4	.. ..	.. ..
Clean coal.....	1 10	1 3	1 3½	1 0	.. ..
Shaly coal.....	a 0 5½	a 0 2½	a 0 1½	a 0 2	.. ..
Coal.....	.. ..	.. ..	.. ..	.. ..	a 4 0
Shale.....	.. ..	.. ..	.. ..	.. ..	a 3 0
Coal.....	.. ..	.. ..	.. ..	.. ..	a 7 0
Shale.....	.. ..	.. ..	.. ..	.. ..	a 0 ½
Coal, clean.....	6 7	7 3	7 6	7 ½	9 0
Floor, clay.....	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of bed.....	.. ..	28 11½	34 3	33 2½	23 ½
Thickness of coal sampled.....	8 5	8 6	8 9½	8 ½	9 0

a Not included in sample.

Section A (sample 10818) was measured at the face of room 9, off west entry 5 off the main entry.

Section B (sample 10819) was measured at the face of the main air course which is also a manway.

Section C (sample 10820) was measured at the face of room 3, off west entry 7.

Section D (sample 10821) was measured at the face of room 6, off east entry 5 off the main entry.

Section E (sample 12641) was measured in the east entry, 2,100 feet from the mine mouth.

The bed was also measured and sampled at seven points by O. U. Bradley on January 23 to 25, 1913, as described below:

Sections of coal bed in Kooi mine.

Section.....	A	B	C	D	E	F	G
Laboratory No.....	16060	16061	16062	16063	16064	16065	16066
Roof, 4 to 6 feet of coal.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Clean coal.....	6 10	9 0	6 9	6 9	7 6	8 4	7 1
Bony coal.....	a 0 4	.. ..	a 0 3	a 0 5	a 0 6	.. ..	a 0 8
Clean coal.....	1 1	.. ..	1 2	1 0	1 0	.. ..	1 1
Floor, underclay.....	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
Thickness of coal mined.....	8 3	9 0	8 2	8 2	9 0	8 4	8 10
Thickness of coal sampled.....	7 11	9 0	7 11	7 9	8 6	8 4	8 2

a Not included in sample.

Section A (sample 16060) was measured at the face of room 20, off the fifth east entry, first panel.

Section B (sample 16061) was measured at the face of room 9, off the fifth east entry, fourth panel.

Section C (sample 16062) was measured at the face of the fifth east entry, 1,900 feet from the main slope.

Section D (sample 16063) was measured at the last crosscut, eleventh east entry, 165 feet from main slope.

Section E (sample 16064) was measured at the face of room 4, off tenth east entry, fourth panel, room just turned.

Section F (sample 16065) was measured at the face of room 7, off tenth east entry, second panel.

Section G (sample 16066) was measured at the face of the twelfth west entry, 185 feet from main slope.

A composite sample was made by mixing the face samples 16060 to 16066, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 16067.

Notes.—The Kooi mine is opened by a slope 3,550 feet above sea level and is worked by the room-and-pillar panel system. At the time of sampling the coal was undercut by puncher and electric chain breast machines and broken down with black blasting powder. The machine cuttings were loaded with the coal. The screening plant consisted of shaking screens 6 by 8 feet with 6-inch openings, 6 by 9 feet with 2½-inch openings, 6 by 7 feet with 1¼-inch openings, and 6 by 7 feet with ¾-inch openings. Thirty per cent of the coal passed over the 6-inch screen. The lumps on the car were large and had a good appearance. There were five loading tracks with a capacity of 60 empty cars and 60 loaded cars. Twenty-seven per cent of the coal was shipped in run-of-mine form. Estimated probable life of the mine, 15 to 20 years. The estimated average output at time of sampling was 1,000 tons a day; maximum day's run 1,600 tons.

MONARCH. MONARCH MINES.

Sample.—Subbituminous coal; Sheridan field; analyses Nos. 12005, 12006, 12008, 12685, 15830, 15831, 15832, 15833, 15834, 15835, 35836, and 15837 (p. 143).

Mines.—Monarch and New Monarch, drift mines. The Monarch is at Monarch and the New Monarch is in the SE. ¼ sec. 24, T. 57 N., R. 85 W., west of Monarch, with railroad connections to the main line of the Chicago, Burlington & Quincy Railroad.

Coal bed.—Monarch. Tertiary age, Fort Union formation. Average thickness, 30 feet, about 10 feet of which is mined. The bed dips slightly to the southeast. The upper part of the bed consists of coal mixed with bands of shale which are nonpersistent; mining is confined to the lower part. Floor, dark-gray underclay which becomes very soft and swells when wet. The Carney bed is 90 feet below the Monarch. The cover at the points where samples were taken ranges from 40 to 300 feet.

The bed was measured and sampled at three points in the old mine by H. M. Wolfen, on March 29, 1911; and at one point in the new mine by O. B. Hopkins, on October 4, 1911.

Sections of coal bed in Monarch mines.

Section.....	A	B	C	D
Laboratory No.....	12005	12006	12008	12685
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	.. ..	.. ..	.. ..	a 6 0
Shale.....	.. ..	.. ..	.. ..	a 3 0
Coal.....	.. ..	.. ..	.. ..	a 6 0
Clean bright coal.....	7 10	5 4	8 2	10 0
Dull hard coal.....	.. ..	0 9	.. ..	.. ..
Clean bright coal.....	.. ..	2 1	.. ..	.. ..
Floor, underclay.....	.. ..	.. ..	.. ..	.. ..
Thickness of coal sampled.....	7 10	8 2	8 2	10 0

a Not included in sample.

Section A (sample 12005) was measured on the pillar of butt entry 3, off west entry 9, near room 70.

Section B (sample 12006) was measured at the face of room 70, near west entry 7.

Section C (sample 12008) was measured on a pillar in west entry 9, near room 70.

Section D (sample 12685) was measured 800 feet southwest of the mine mouth.

The bed was also measured and sampled at seven points in the new mine by O. U. Bradley on January 11 to 17, 1913, as described below:

Section A (sample 15830) was measured at the face of east entry 6, 250 feet from main haulage slope. The sample represented a 9-foot 2-inch cut of clean coal.

Section B (sample 15831) was measured at the face of west entry 8.

Section C (sample 15832) was measured at the face of west entry 13, off old slope. The sample represented an 8-foot 11-inch cut of clean coal.

Section D (sample 15833) was measured in west entry 4, opposite butts 5 and 6, 800 feet from haulage way. The sample represented a 10-foot 1-inch cut of clean coal.

Section E (sample 15834) was measured at the face of room 8, off butt entry 4, off west entry 4. The sample represented a 10-foot 4-inch cut of clean coal.

Section F (sample 15835) was measured on a pillar between rooms 24 and 25, off west entry 12. The sample represented a 9-foot cut of clean coal.

Section G (sample 15836) was measured on a pillar between rooms 5 and 6, off butt entry 2, off west entry 3. The sample represented a 9-foot 9-inch cut of clean coal.

A composite sample was made by mixing samples 15830 to 15836, inclusive. The results of an ultimate analysis of this sample are given under laboratory No. 15837.

Notes.—The Monarch mine is opened by a drift and the coal is mined by the double-entry room-and-pillar panel system. At the time of sampling the coal was undercut by electric chain coal-cutting machines and broken down with FF black powder. Machine cuttings were loaded out with the coal. No impurities mixed with the coal in loading. About one-third of the coal was shipped as run-of-mine and about 68 per cent of the remainder passed through the screens. The tippie was equipped with bar screens, one 12 feet long with 5-inch openings, one 12 feet long with 4-inch openings, and shaker screens, one 12 by 6 feet with $2\frac{1}{2}$ and $1\frac{1}{4}$ inch openings, and one 12 feet long with 1-inch openings. No pickers were employed on the cars. The mine had a storage bin with a capacity of 280 tons. The lumps and slack appeared fairly good on the cars. Eight loading tracks were available with a capacity of 100 empty and 100 loaded cars. Fifty per cent of the coal mined was from advance workings. The mine had approximately 300 acres unmined. Average daily output, 1,600 tons.

NEW ACME. NEW ACME MINE.

Sample.—Subbituminous coal; Sheridan field; analyses Nos. 16055, 16056, 16057, 16058, and 16059 (p. 143).

Mine.—New Acme, a drift mine in sec. 22, T. 57 N., R. 84 W., at New Acme, on a spur of the Chicago, Burlington & Quincy Railway, three-fourths of a mile from the main line.

Coal bed.—Known as the Monarch. Tertiary (Eocene) age, Fort Union formation. The thickness of the coal bed ranges from 16 to 30 feet, of which $6\frac{1}{2}$ to 10 feet is mined. Coal was left for roof as the overlying strata was weak. Many fires originated in the roof coal, particularly when the pillars were being pulled. The floor was coal in all places examined or sampled. The floor of the Monarch seam as exposed elsewhere is composed chiefly of dark carbonaceous shale and squeezes and swells when wet.

There is about 50 to 100 feet of cover at the points where the samples were collected.

The coal bed was measured and sampled at four points in the mine on January 20 and 21, 1913, by O. U. Bradley, as described below:

Section A (sample 16055) was measured at the face of west entry 7, 150 feet from the main slope. The sample represented a 6-foot 8-inch cut of clean coal.

Section B (sample 16056) was measured at the face of room 4, off east entry 5. The sample represented a 7-foot 2-inch cut of clean coal.

Section C (sample 16057) was measured at the face of room 13, off east entry 3. The sample represented a 7-foot 7-inch cut of clean coal.

Section D (sample 16058) was measured at the face of room 11, off east entry 2. The sample represented a 6-foot 9-inch cut of clean coal.

A composite sample was made by mixing samples 16056 to 16058, inclusive. The results of an ultimate analysis of this sample are shown under laboratory No. 16059.

Notes.—The New Acme mine is opened by a drift. The coal was mined by the room-and-pillar and later by the panel system. At the time of sampling the coal

was undercut by electric breast machines and broken down with black powder. About 35 per cent of the coal was shipped as run-of-mine, 70 per cent of the coal going to the screen passed through. The screening equipment consisted of bars 4 by 8 feet with 5-inch openings; shaker screens 8 by 12 feet, the diameter of holes being $1\frac{1}{2}$, $2\frac{1}{2}$, 4, and 6 inches; and revolving screens 24 feet long divided into sections as follows: 8 feet with $\frac{1}{2}$ -inch holes, 8 feet with 1-inch holes, 4 feet with $2\frac{1}{2}$ -inch holes, and 4 feet with $3\frac{1}{2}$ -inch holes. No pickers were employed on the cars. The mine had a storage bin of 500 tons capacity. The lump coal on the cars appeared dull; the lumps were small. The mine had three loading tracks with a capacity for 86 empty cars and 86 loaded cars. A runaround for switching permitted loading while cars were being shifted or loads taken out. As the tippie was rather high, there was more or less breakage in the handling of the coal. There was approximately 1,000 acres to be mined. The daily output averaged about 1,000 tons, with a maximum day's run of 1,420 tons. The estimated life of the mine was 50 years.

SWEETWATER COUNTY.

GUNN. "B" MINE.

Sample.—Subbituminous coal; Rock Springs field; analyses Nos. 11507, 11508, 11509, and 11510 (p. 144).

Mine.—Gunn-Quealy "B," a slope mine in sec. 8, T. 19 N., R. 104 W., at Gunn, 4 miles from Baxter, on a branch line from the Union Pacific Railroad.

Coal bed.—Locally known as No. 11. Cretaceous age, Mesaverde formation. Average thickness, 6 feet 1 inch; dip, $7\frac{1}{2}^{\circ}$ S., 80° W.; cleat S. 70° E. Roof, shale, about 16 feet thick; floor, shaly sandstone; cover, at points where samples were taken, 350 to 360 feet thick.

The bed was measured and sampled at three points in the mine by S. S. Smith on December 22, 1910, as described below:

Section A (sample 11507) was measured at the face of room 15, off entry 5. The sample represented a 6-foot 2-inch cut.

Section B (sample 11508) was measured at the face of room 25, off entry 4. The sample represented a 6-foot 1-inch cut.

Section C (sample 11509) was measured at the face of room 8, off entry 8. The sample represented a 6-foot 2-inch cut.

Notes.—The room-and-pillar system of mining was employed. At the time of sampling the coal was undercut with electric chain cutters. Black powder was used for breaking down the coal and dynamite for brushing the roof. About 30 per cent of the coal was shipped as run-of-mine; the remainder was sized by shaking and revolving screens. No hand picking was done. There were four loading tracks with capacity for 100 cars.

The daily production was 1,000 tons, 80 per cent being obtained from advance work. About 375 acres of unmined coal was tributary to this slope.

SUPERIOR. B MINE.

Sample.—Bituminous coal; Rock Springs field; analyses Nos. 11461, 11462, 11463, and 11464 (p. 144).

Mine.—B, a drift mine in sec. 29, T. 21 N., R. 102 W., 2 miles northeast of Superior, on a branch of the Union Pacific Railroad from Thayer Junction and only a few miles north of the main line.

Coal bed.—No. 1. Cretaceous age, Mesaverde formation. Locally known as No. 7 of the Laramie. Average thickness, 6 feet 6 inches; dip, $4\frac{1}{2}^{\circ}$ NE. The roof is a smooth black shale 15 feet thick with a sandstone cap rock; the floor is a hard smooth shale; the covering at the point of sampling is 400 feet.

The bed was measured and sampled at four points in the mine by S. S. Smith on December 14, 1910, as described below:

Sections of coal bed in the B mine.

Section.....	A	B	C	D
Laboratory No.....	11461	11462	11463	11464
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	.. ..	1 1	1 6	.. ..
Rock parting.....	.. ..	0 1	0 1	.. ..
Coal.....	7 2	6 3½	5 9½	6 3½
Floor, shale.....				
Thickness of bed.....	7 2	7 4½	7 3¾	6 3½
Thickness of coal sampled.....	7 2	7 4½	7 3¾	6 3½

Section A (sample 11461) was measured at the face of room 27, off the inside dip entry.

Section B (sample 11462) was measured at the face of south entry 2.

Section C (sample 11463) was measured at the face of room 20, off south entry 3.

Section D (sample 11464) was measured at the face of room 11, off north entry 3.

Notes.—The coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut with electric chain cutters; black powder and a permissible explosive was used for breaking down the coal; 75 per cent of the coal produced was from advance workings; daily output 1,200 tons; unmined area tributary to this opening, 250 acres.

SUPERIOR. SUPERIOR C MINE.

Sample.—Subbituminous coal; Rock Springs field; analyses Nos. 11456, 11457 11458, and 11459 (pp. 144, 145).

Mine.—C, a slope mine in sec. 21, T. 21 N., R. 102 W., at Superior, on a branch line of the Union Pacific Railroad from Thayer Junction.

Coal bed.—Unnamed. Cretaceous age, Mesaverde formation, known locally as No. 1 of the Laramie. Average thickness, 8 feet 6 inches; dip 4½° NE. The cleat is well defined and extends east and west. Roof, black shale 4 to 8 feet thick, above which is a heavy capping of sandstone; floor, hard, smooth shale. The cover at points where samples were taken is about 250 feet.

The bed was measured and sampled at four points by S. S. Smith on December 14, 1910, as described below:

Sections of coal bed in the Superior C mine.

Section.....	A	B	C	D
Laboratory No.....	11456	11457	11458	11459
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	1 10	2 3	.. ..	2 3
Rock.....	a 0 1½	a 0 1½	.. ..	a 0 1½
Coal.....	6 8	6 3	6 7	6 2
Floor, shale.....				
Thickness of bed.....	8 7½	8 7½	6 7	8 6½
Thickness of coal sampled.....	8 6	8 6	6 7	8 5

a Not included in sample.

Section A (sample 11456) was measured at the face of room 15, off south entry 6.

Section B (sample 11457) was measured at the face of room 25, off south entry 5.

Section C (sample 11458) was measured at the face of room 1, off north entry 7.

Section D (sample 11459) was measured at the face of room 38, off south entry 4.

Notes.—The mine is opened by a slope in the coal bed and is worked by the room-and-pillar system. At the time of sampling 90 per cent of the coal produced was from advance work; black powder and a permissible explosive were used for breaking the coal after undercutting by electric machines. Daily production of mine, 1,300 to 1,400 tons; unmined area tributary to this opening, 1,200 acres.

UINTA COUNTY.

ELKOL. ELKOL MINE.

Sample.—Bituminous coal; Kemmerer field; analyses Nos. 11730 and 11731 (p. 145).

Mine.—Elkol, a slope mine in sec. 11, T. 20 N., R. 117 W., near Elkol, 8 miles southwest of Diamondville on the Oregon Short Line Railroad.

Coal bed.—Locally known as No. 1. Cretaceous age, Frontier formation. The coal bed is 51 feet thick and at the points where the samples were taken is 1,600 feet below the surface. The coal bed was sampled at 2 points in the mine by S. S. Smith on February 9, 1911, as described below:

Sections of coal bed in Elkol mine.

Section.....	A		B	
	11730		11731	
Laboratory No.....	Ft. in.		Ft. in.	
Roof, not stated.....	a 27	6	a 27	6
Coal.....	8	6	8	6
Coal, soft and black.....	a 15	0	a 15	0
Coal.....				
Floor, not stated.....				
Thickness of bed.....	51	0	51	0
Thickness of coal sampled.....	8	6	8	6

a Not included in sample.

Section A (sample 11730) was measured at the face of north entry 3, 1,900 feet from the slope mouth.

Section B (sample 11731) was measured at the face of room 1, off north entry 3.

Notes.—The State mine inspector's report for the fiscal year ended September 30, 1910, gives the total production for that year as 50,000 tons, which was shipped to points in Utah, Idaho, Oregon, Washington, and California.

FRONTIER. KEMMERER NO. 1 MINE.

Sample.—Bituminous coal; Kemmerer field; analyses Nos. 11565, 11566, 11567, and 11568 (p. 145).

Mine.—No. 1, a slope mine in sec. 12, T. 21 N., R. 116 W., at Frontier, on a branch of the Oregon Short Line Railroad.

Coal bed.—Cretaceous age, Frontier formation. Locally known as No. 1 of the Laramie. Average thickness, 7 feet; dip, 13° west; well-defined cleat. Roof, draw slate, 3 feet 6 inches thick, which stands fairly well, overlain by shaly sandstone; floor, hard, smooth fire clay. Cover at points where samples were taken varies from 175 to 400 feet.

The bed was measured and sampled at four points in the mine by S. S. Smith on January 11, 1911, as described below:

Sections of coal bed in the Kemmerer No. 1 mine.

Section.....	A		B		C		D	
	11565		11566		11567		11568	
Laboratory No.....	Ft. in.		Ft. in.		Ft. in.		Ft. in.	
Roof, shale.....	3	7	4	9	1	6	1	6
Coal (hard).....	a 0	1	a 0	4	a 0	6	a 0	10
Soft rock parting.....	4	9	3	4	3	10	3	8
Coal (soft).....								
Floor, fire clay.....								
Thickness of bed.....	8	4 1/2	8	5	5	10	6	0
Thickness of coal sampled.....	8	4	8	1	5	4	5	2

a Not included in sample.

Section A (sample 11565) was measured at the face of room 16, off south entry 13, and 400 feet below the surface.

Section B (sample 11566) was measured on the pillar of room 18, off north entry 10, and 240 feet below the surface.

Section C (sample 11567) was measured at the face of room 3, off north entry 7, and 175 feet below the surface.

Section D (sample 11568) was measured on the pillar of room 62, off south entry 7, and 200 feet below the surface.

Notes.—The mine is worked by the room-and-pillar system. At the time of sampling the coal was shot from the solid with FFF black powder. The coal was shipped as run-of-mine; the lumps were large and bright, but the slack was dull. Pickers sorted out inferior coal and shale as the coal was loaded on the car. There were 5 loading tracks with capacity for 150 cars. The daily production was 600 tons.

For analyses and descriptions of other samples of coal from this mine see Bull. 22, p. 1150.

KEMMERER. PROSPECT.

Sample.—Subbituminous coal; Kemmerer field, analysis No. 11740 (p. 145).

Mine.—A prospect in sec. 33, T. 22 N., R. 116 W., $2\frac{1}{2}$ miles north of the Oregon Short Line Railroad and $1\frac{1}{2}$ miles west of Kemmerer.

Coal bed.—Cretaceous age, Frontier formation. Thickness, 16 feet; roof, sandstone; floor, fire clay.

The bed was sampled by S. S. Smith on February 12, 1911, at the face of the first entry, 200 feet from the mouth of the slope. The vertical depth at which the sample was taken was 150 feet.

SUSIE. KEMMERER NO. 4 MINE.

Sample.—Bituminous noncoking coal; analyses Nos. 13517, 13518, and 13519 (p. 145).

Mine.—Kemmerer No. 4, a slope mine at Susie, 4 miles north of Kemmerer, on a spur of the Oregon Short Line Railroad, secs. 25 and 26, T. 22 N., R. 116 W.

Coal bed.—Kemmerer No. 1. Cretaceous age, Frontier formation. Average thickness, 3 feet 7 inches to 5 feet 6 inches; dip 19° W.; no faults but a few rolls and horsebacks; cleat runs north and south. Roof, shale; in places there is as much as 3 feet of "draw slate," which comes down with the coal. The floor consists of a hard rough shale. Particles of the roof and floor did not get mixed with the coal in loading. The thickness of the cover at the points where the samples were taken varies from 700 to 750 feet.

The coal bed was measured and sampled at two points in the mine by J. C. Roberts on January 23, 1912, as described below:

Sections of coal bed in Kemmerer No. 4 mine.

Section.....	A	B
Laboratory No.....	13517	13518
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	3 6	4 3
Clay parting.....	0 2	.. ..
Coal.....	1 6	.. ..
Floor, shale.....		
Thickness of bed.....	5 2	4 3
Thickness of sampled.....	5 2	4 3

Section A (sample 13517) was measured 1,000 feet from mouth of slope.

Section B (sample 13518) was measured at the face of the second north entry, 1,300 feet from mouth of slope.

A composite sample was made by mixing samples 13517 and 13518. The results of an ultimate analysis of this sample are shown under laboratory No. 13519.

Notes.—The No. 4 mine was opened by a slope and the coal was mined by the room-and-pillar system. The coal was shot off the solid with black powder. Dynamite was used in brushing the floor and roof. The screening equipment consisted of shaking screens 32 feet long and 6 feet wide—16 feet with 3-inch openings and 16 feet with $\frac{1}{2}$ -inch openings. No pickers were employed on the cars. There were five loading tracks with a capacity of 30 empty cars and 20 loaded cars. The average daily output was 500 tons a day with a maximum day's run of 700 tons; all of the coal was shipped as run-of-mine. About 75 per cent of the coal was taken from advance workings.

WESTON COUNTY.

CAMBRIA. ANTELOPE No. 3 AND No. 4 MINES.

Sample.—Subbituminous to cannel coal; Black Hills region (Wyoming No. 2) analyses Nos. 16412, 16413, 16414, 16415, 16428, 16429, 16430, and 16431 (p. 146).

Mine.—Antelope No. 3 and No. 4, drift mines at Cambria, in secs. 19 and 20, T. 46 N., R. 61 W., at end of the spur of the Chicago, Burlington & Quincy Railroad, $6\frac{1}{2}$ miles from Newcastle.

Coal bed.—Not named, probably a local bed. Cretaceous age, Lakota formation. Average thickness, 5 feet, varying from 2 feet 6 inches to 8 feet. Many mud and sand pockets occur in parts of the mine. Sandstone, shale, and bony coal partings appear in the coal at varying intervals. The coal itself varies greatly in character from subbituminous to cannel coal. The coal bed is uneven; one room may be going to the dip and a parallel room going to the rise. Roof, a black sandy shale over which is 1 to 2 feet of granular sandstone which gives considerable trouble if not closely watched. Floor is rough and uneven; small metallic concretions and large hard nodules called "nigger heads" are common. It is for the most part hard black shale and sandstone. Particles of the roof and bottom did not mix with the coal in loading. The thickness of the cover at the points where the samples were taken varies from 25 feet to 225 feet.

The coal bed was measured and sampled at six points in the mine by O. U. Bradley on February 11 and 12, 1913, as described below:

Sections of coal bed in the Antelope No. 3 and No. 4 mines.

Section.....	A	B	C	D	E	F
Laboratory No.....	16412	16413	16414	16428	16429	16430
Roof, shale.....	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....	.. ..	3 2	2 3	.. ..	1 0	2 1
Rock or splint.....	.. ..	a 0 8	a 1 9	.. ..	a 0 6	a 0 6
Coal.....	0 8	0 11	1 4	.. ..	1 0	.. ..
Rock.....	a 1 0	a 0 2	a 1 0	.. ..	a 0 3	.. ..
Coal.....	2 3	1 2	2 7	b 3 9	4 6	4 10
Floor, black shale and sandstone.....						
Thickness of bed.....	3 11	6 1	8 11	3 9	7 3	7 5
Thickness of coal sampled.....	2 11	5 3	6 2	3 9	6 6	6 11

a Not included in sample.

b Contains two streaks of bony coal $\frac{1}{2}$ to $\frac{3}{4}$ inch thick, which is loaded with the coal.

Section A (sample 16412) was measured at the face of east entry 1, No. 4 mine.

Section B (sample 16413) was measured at the face of north entry 1, off east entry 1, No. 4 mine.

Section C (sample 16414) was measured at the face of room 29, off east entry 3, No. 4 mine.

A composite sample was made by mixing samples 16412, 16413, and 16414. The results of an ultimate analysis of this sample are given under laboratory No. 16415.

Section D (sample 16428) was measured at the face of room 35, off east entry 5, No. 3 mine.

Section E (sample 16429) was measured at the face of west entry 8, No. 3 mine.

Section F (sample 16430) was measured at the face of west entry 7, No. 3 mine.

A composite sample was made by mixing samples 16428, 16429, and 16430. The results of an ultimate analysis of the sample are given under laboratory No. 16431.

Notes.—The coal is mined by the room-and-pillar system. At the time of sampling the coal was undercut by compressed-air punching machines and broken down with black blasting powder. Dynamite was used for brushing the floor and roof. The machine cuttings were loaded with the coal. The entire output of the mines was run through a rock crusher to facilitate picking. It was then sized and resized and loaded into cars. The Chicago, Burlington & Quincy Railroad bought the entire output for steaming purposes. The coal burns well, especially under forced draft, and is particularly suited to railroad work.

MOORCROFT. LOCAL MINE.

Sample.—Subbituminous coal; Upper Belle Fourche River field; analysis No. 12446 (p. 146).

Mine.—Local drift mine, 12 miles south of Moorcroft and of the Chicago, Burlington & Quincy Railroad.

Coal bed.—Not named, a local bed.

The bed was measured and sampled by A. W. Stickney on July 17, 1911, as described below:

Section of coal bed in local mine, about 12 miles south of Moorcroft.

Laboratory No.	12446
Roof, sandy shale.	<i>Fr. in.</i>
Bone.	^a 0 1
Coal.	2 11
Floor, carbonaceous shale.	
Thickness of bed.	3 0
Thickness of coal sampled.	2 11

^a Not included in sample.

The sample was taken from the face of the entry, 100 feet from the entrance.

MOORCROFT. PROSPECT.

Sample.—Subbituminous coal; Upper Belle Fourche River field; analysis No. 12392 (p. 146).

Location.—Prospect opened by sampler about 12 miles southwest of Moorcroft and of the Burlington Railroad, in the SE. $\frac{1}{4}$ sec. 29, T. 48 N., R. 68 W.

Coal bed.—Local lense in Lance formation. Tertiary or Cretaceous age. Thickness, 2 feet 4 inches; roof, clay; floor, carbonaceous shale.

The bed was measured and sampled by A. W. Stickney on June 27, 1911. The sample represented a 2-foot 4-inch cut of coal, the thickness of the bed.

BIBLIOGRAPHY.

Under the description of each sample in this report reference has been made to the publication of the United States Geological Survey containing a description of the geologic relations of the coal bed or the composition of the coal.

A bibliographical list of the United States Geological Survey publications dealing with coal is given in "Mineral Resources of the United States, 1910" (U. S. Geol. Survey, 1911), pages 226-242. This list is also published as a separate by the United States Geological Survey.

The references given below are chiefly the publications of State surveys, and refer to papers of a general nature rather than to descriptions of separate localities. The list is incomplete, but it is believed to contain the more important references, other than those in reports of the Geological Survey, to the composition and geologic relations of the various coals in this country.

ALABAMA.

GIBSON, A. M. Report on the Coal Measures of Blount Mountain, with map and sections. Ala. Geol. Surv., 1893, pp. 7-80. Describes the topography and geologic structure of the region and the stratigraphy of the lower and upper coal measures, with a detailed description of the coal seams. Gives chemical analyses of some of the coals.

MCCALLEY, HENRY. Report on the coal measures of the plateau region of Alabama. Ala. Geol. Surv., 1891, 238 pp.

— Report on the Tennessee Valley region. Ala. Geol. Surv. Rept., pt. 1, 1896, 436 pp. Describes the general features of the stratigraphy, and the occurrence of coal, etc. Gives local geologic details by counties.

— Report on the Warrior coal basin. Ala. Geol. Surv., 1900, 327 pp. Gives numerous sections of coal beds.

SQUIRE, JOSEPH. Report on the Cahaba coal field. Ala. Geol. Surv., 1890, 187 pp.

ARKANSAS.

STEEL, A. A. Coal mining in Arkansas. Geol. Surv. of Ark., vol. 1, 1910, 632 pp.; vol. 2, 1910, 383 pp.

WINSLOW, ARTHUR. The geology of the coal regions. Ann. Rept. Geol. Surv. of Ark. for 1888, vol. 3, 1888, 122 pp. Gives geologic sections, also analyses of coals.

COLORADO.

COLORADO STATE BUREAU OF MINES. Report of the State Bureau of Mines for the years 1905-6. 1907. 127 pp.

HEADDEN, W. P. A study of some Colorado coals—a comparison of some coals from Boulder, Routt, and Delta Counties. Colo. Sci. Soc. Proc., vol. 8, May, 1907, pp. 281-300.

— An examination of some coals from Routt County, Colo. Colo. Sci. Soc. Proc., vol. 8, March, 1907, pp. 257-280.

PARSONS, H. F., and LIDDELL, C. A. The coal and mineral resources of Routt County. Colorado School of Mines Bull., vol. 1, no. 4, 1903, pp. 47-59.

GEORGIA.

- McCALLIE, S. W. A preliminary report on the coal deposits of Georgia. Geol. Surv. Ga. Bull. 12, 1904, 121 pp.
- A preliminary report on the mineral resources of Georgia. Geol. Surv. Ga. Bull. 23, 1910, pp. 67-75.

ILLINOIS.

- BAIN, H. F., AND OTHERS. Studies of Illinois coals. Am. Inst. Min. Eng. Bull. 24, 1908, pp. 1099-1170.
- Studies of Illinois coal. Ill. State Geol. Surv. Bull. 14, 1909, pp. 183-253.
- BEMENT, A. Distribution of the coal beds of the State [of Illinois]. Ill. State Geol. Surv. Bull. 3, 1906, pp. 19-25. Discusses the occurrence and mining of the workable seams of Illinois.
- The Illinois coal field. Ill. State Geol. Surv. Bull. 16, 1910, pp. 182-202.
- CADY, G. H. The geology and coal resources of the West Frankfort quadrangle. Ill. State Geol. Surv. Bull. 16, 1910, pp. 244-265.
- DE WOLF, F. W. Coal investigations in Saline and Williamson Counties, Ill. Ill. State Geol. Surv. Bull. 8, 1908, pp. 230-245. Describes the stratigraphy and structure of the field, and the occurrence and character of the coals.
- Coal investigations in the Saline-Gallatin field, Illinois, and the adjoining area. Ill. State Geol. Surv. Bull. 8, 1908, pp. 211-229.
- The coal resources of Illinois. Am. Inst. Min. Eng. Bull. 24, November, 1908, pp. 1103-1112.
- The coal resources of Illinois. Ill. State Geol. Surv. Bull. 14, 1909, pp. 189-196.
- DE WOLF, F. W., AND OTHERS. Studies of Illinois coal. Ill. State Geol. Surv. Bull. 16, 1910, pp. 177-301.
- LINDGREN, J. M. The sampling and analysis of Illinois coals. Ill. State Geol. Surv. Bull. 14, 1909, pp. 196-203. Gives analyses of coals from various parts of the State.
- PARR, S. W. Chemical analyses of certain coals. Ill. State Geol. Surv. Bull. 4, 1907, pp. 188-197.
- Composition and character of Illinois coals. Ill. State Geol. Surv. Bull. 3, 1906, pp. 27-78.
- The chemical composition of Illinois coal. Ill. State Geol. Surv. Bull. 16, 1910, pp. 203-243.
- SAVAGE, T. E. The geology and coal resources of the Herrin, Ill., quadrangle. Ill. State Geol. Surv. Bull. 16, 1910, pp. 266-285.
- SHAW, E. W. The geology and coal resources of the Murphysboro quadrangle, Illinois, Ill. State Geol. Surv. Bull. 16, 1910, pp. 286-294.
- UDDEN, J. A. Coal deposits and possible oil field near Duquoin, Ill. Ill. State Geol. Surv. Bull. 14, 1909, pp. 254-262.
- UDDEN, J. A., and DE WOLF, F. W. Notes on the Belleville-Breese area. Ill. State Geol. Surv. Bull. 8, 1908, pp. 313-334.

INDIANA.

- ASHLEY, G. H. Supplementary report [to report of 1898] on the coal deposits of Indiana. Ind. Dept. Geol. and Nat. Res., 33d Ann. Rept., 1909, pp. 13-150.
- The coal deposits of Indiana. Ind. Dept. Geol. and Nat. Res., 23d Ann. Rept., 1899, pp. 1-1428. Describes general geologic occurrence and distribution of coal, the general geology of the coal measures of Indiana, and the detailed geology in various counties. Presents analyses of certain coals.
- NOYES, W. A. Composition of Indiana coals. Ind. Dept. of Geol. and Nat. Hist., 21st Ann. Rept., 1897, pp. 97-107. Describes the methods of analyses and in tabular form shows the chemical composition of coal from various mines.

IOWA.

- AREY, M. F. Geology of Davis County. Iowa Geol. Surv., vol. 20, 1910, pp. 487-524.
- Geology of Wayne County. Iowa Geol. Surv., vol. 20, 1910, pp. 199-236.
- BEYER, S. W. Coal statistics [Iowa]. Iowa Geol. Surv., vol. 19, 1909, pp. 591-597.
- Mineral production in Iowa in 1905. Iowa Geol. Surv., vol. 16, 1906, pp. 17-36.
- BEYER, S. W., and YOUNG, L. E. Geology of Monroe County [Iowa]. Iowa Geol. Surv., vol. 13, 1903, pp. 355-422. Describes the character and occurrence of coal seams and the coal-mining operations in the county, and gives analyses of certain coals.
- HINDS, HENRY. The coal deposits of Iowa. Iowa Geol. Surv., vol. 19, 1909, pp. 21-396.
- KEYES, C. R. Coal deposits of Iowa. Iowa Geol. Surv., vol. 2, 1894, 536 pp.
- Stages of the Des Moines or chief coal-bearing series of Kansas and southwest Missouri and their equivalents in Iowa. Iowa Acad. Sci. Proc., vol. 4, 1897, pp. 22-25.
- LEES, J. H. Bibliography of Iowa coals. Iowa Geol. Surv., vol. 19, 1909, pp. 659-697.
- History of coal mining in Iowa. Iowa Geol. Surv., vol. 19, 1909, pp. 523-588.
- LEES, J. H., and HIXON, A. W. Analyses of Iowa coals. Iowa Geol. Surv., vol. 19, 1909, pp. 476-519.
- MACBRIDE, T. H. Geology of Hamilton and Wright Counties. Iowa Geol. Surv., vol. 20, 1910, pp. 97-149.
- SAVAGE, T. E. Report on tests of Iowa coals made at the Government coal-testing plant at the Louisiana Purchase Exposition, St. Louis, Mo., 1904. Iowa Geol. Surv. Bull. 2, 1905, pp. 22-38.
- WILDER, F. A. Fuel values of Iowa coals. Iowa Geol. Surv., vol. 19, 1909, pp. 397-475.

KANSAS.

- CRANE, W. R. Geography and detailed stratigraphy of the Kansas Coal Measures; description of mines, mining methods, and mining machinery; chemical and physical properties of Kansas coals; output and commerce; mining directory and mining laws. Kans. Univ. Geol. Surv., vol. 3, 1893, pp. 108-336.
- HAWORTH, ERASMUS. The coal fields of Kansas. Kans. Univ. Quart., vol. 3, 1895, pp. 297-309.
- The stratigraphy of the Kansas Coal Measures. Kans. Univ. Quart., vol. 3, 1895, pp. 271-290.
- LANGWORTHY, A. E. The Atchison [Kansas] diamond-drill prospect hole. Kans. Acad. Sci. Trans., vol. 17, 1901, pp. 45-52.

KENTUCKY.

- CRANDALL, A. R. Coals of the Licking Valley region. Ky. Geol. Surv. Bull. 10, 1910, 90 pp.
- The coals of the Big Sandy Valley south of Louisa and between Tug Fork and the headwaters of the north fork of the Kentucky River. Ky. Geol. Surv. Bull. 4, 1905, 141 pp. Describes the general geology and topography of the area, the occurrence, character, thickness, and relations of the coal seams, giving numerous sections, and the character and composition of the coals.
- FOHS, F. J. Coals of the region drained by the Quicksand Creeks in Breathitt, Floyd, and Knott Counties. Ky. Geol. Surv. Bull. 18, 1912, 79 pp. Discusses geology of the coal beds and presents analyses of coals.
- GLENN, L. C. A geological reconnaissance of the Tradewater River region, with special reference to the coal beds. Ky. Geol. Surv. Bull. 17, 1912, 75 pp.

- HODGE, J. M. Report on the coals of the three forks of the Kentucky River. Ky. Geol. Surv. Bull. 11, 1910, 280 pp. Presents analyses and discusses the geology.
- Summary of report on the region drained by the three forks of the Kentucky River. Ky. Geol. Surv. Rept. of Progress for 1906 and 1907, 1908, pp. 36-45. Includes an account of the distribution and character of the coal beds in this area.
- The Big Stone Gap coal field. Trans. Am. Inst. Min. Eng., vol. 21, 1893, pp. 922-938, 1005-1006. Describes the geology of the region, illustrated by sections of Little and Big Black Mountain and the geologic position of the different coal beds with a statement of the character of the coal found in each bed.
- MACFARLANE, GRAHAM. The eastern coal region of Kentucky. Trans. Am. Inst. Min. Eng., vol. 25, 1896, pp. 518-532. Gives a section showing the vertical distribution of the coal seams and describes the general features of the coal measures of the region.
- MILLER, A. M. Abstract of report on the lower (or "conglomerate") measures along the western border of the eastern coal field. Ky. Geol. Surv. Rept. of Progress for 1906 and 1907, 1908, pp. 27-35.
- Coals of the lower measures along the western border of the eastern coal field. Ky. Geol. Surv. Bull. 12, 1910, 83 pp.
- NORWOOD, C. J. Annual reports of the inspector of mines of the State of Kentucky for 1901 and 1902. 1903. 140 pp. Coals of the different districts described.
- PETER, ROBERT. Chemical report of the coals, clays, mineral waters, etc., of Kentucky. Ky. Geol. Surv. Bull. 3, 1905, 77 pp.

MARYLAND.

- CLARK, W. B., AND OTHERS. Report on the coals of Maryland. Md. Geol. Surv. special publication, vol. 5, pt. 4, pp. 221-651.
- CLARK, W. B., and MATHEWS, E. B. Maryland mineral industries, 1896-1907. Md. Geol. Surv., vol. 8, 1909, pp. 97-223.

MICHIGAN.

- COOPER, W. F. Geological report on Bay County [Michigan]. Mich. State Board of Geol. Surv. Ann. Rept., 1905, 1906, pp. 135-426.
- LANE, A. C. Coal of Michigan: its mode of occurrence and quality. Mich. Geol. Surv., vol. 8, pt. 2, 1902, pp. 1-232.
- Fifth annual report of the State geologist [Michigan]. Mich. Geol. Surv. Ann. Rept. for 1903, 1905, 342 pp.
- Sixth annual report of the State geologist [of Michigan] for 1904. Mich. Geol. Surv. Ann. Rept. for 1904, 1905, pp. 113-168.

MISSISSIPPI.

- BROWN, C. S. Lignite of Mississippi. Miss. Geol. Surv. Bull. 3, 1907, 71 pp.

MISSOURI.

- BARBOUR, E. H. Report on the Honey Creek coal mine. Mo. Geol. Surv., vol. 2, 1907, pp. 349-364.
- BUSH, B. F. The coal fields of Missouri. Am. Inst. Min. Eng. Bull. 1, 1905, pp. 165-179; Trans., vol. 35, 1905, pp. 903-917.
- GORDON, C. H. A report of the Bevier sheet, including portions of Macon, Randolph, and Chariton Counties [Missouri]. Mo. Geol. Surv., vol. 9, 1896, 75 pp. Describes the physiographic character of the region and the economic geology of the coal beds.

- HINDS, HENRY. The coal deposits of Missouri. Mo. Bureau Geol. and Mines, vol. 11, ser. 2. 1903. 503 pp. Gives a detailed comprehensive account of the geologic relations of the coal beds and the character and composition of the coal.
- WHITE, DAVID. Age of the lower coals of Henry County, Missouri. Geol. Soc. Am. Bull., vol. 8, 1897, 287-304.
- WINSLOW, ARTHUR. A preliminary report on the coal deposits of Missouri. Mo. Geol. Surv., 1891, pp. 19-226. Describes the topographic and geologic features of the coal-measures formation, the process of its deposition, the distribution and character of the contained coal beds, and the conditions of the coal industry. Gives a description of the coal seams now worked in each county.
- A report on the Higginsville sheet, Lafayette County [Missouri]. Mo. Geol. Surv., vol. 9, 1896, 99 pp. Describes the physiography of the region, the distribution and character of the Carboniferous and Quaternary formations, and the occurrence and character of the coal seams.

MONTANA.

- ROWE, J. P. Montana coal and lignite deposits. Mont. Univ. Bull. 37 (Geol. Ser. 2), 1906, 82 pp.
- STEBINGER, EUGENE. The coal fields of Montana. Am. Inst. Min. Eng. Bull. 81, pp. 2329-2359, September, 1913.

NEW MEXICO.

- SHERIDAN, J. E. Report of the mine inspector for the Territory of New Mexico to the Secretary of the Interior for the year ended June 30, 1906. 1906. 87 pp. Includes notes on the occurrence and character of coal seams and chemical analyses of coals.
- STEVENSON, J. J. The Cerillos coal fields near Santa Fe, New Mexico. N. Y. Acad. Sci., Trans., vol. 15, 1896, pp. 105-122. Describes the character of the Cretaceous deposits and the occurrence and chemical composition of the coals.

NEBRASKA.

- BARBOUR, E. H. Report of the State geologist. Nebr. Geol. Surv., vol. 1, 1903, 258 pp. Includes analyses of certain coals.
- PEPPERBURG, R. V. Coal in Nebraska. Nebr. Geol. Surv., vol. 3, pt. 10, 1910, pp. 275-307.

NORTH DAKOTA.

- LEONARD, A. G., AND OTHERS. Geology of southwestern North Dakota, with special reference to the coal. N. Dak. Geol. Surv., 5th Bienn. Rept., 1908, pp. 27-114.

OKLAHOMA.

- GOULD, C. N., AND OTHERS. Brief chapters on Oklahoma's minerals. Okla. Geol. Surv. Bull. 6, 1910, pp. 33-95.

OHIO.

- BOWNOCKER, J. A. Coals of the Monongahela formation or upper productive coal measures. Ohio Geol. Surv., 4th ser., Bull. 9, 1908, pp. 9-170.
- LORD, N. W., and SOMERMEIER, E. E. Chemical analyses and calorific tests of the Clarion, Lower Kittanning, Middle Kittanning, and Upper Freeport coals. Ohio Geol. Surv., 4th ser., Bull. 9, 1908, pp. 170-339.
- ORTON, EDWARD. The coal fields of Ohio. Ohio Geol. Surv., vol. 7, 1893, pp. 253-290. Discusses the origin of coal and describes the various coal seams of the Carboniferous strata in Ohio.

PENNSYLVANIA.

- ASHBURNER, C. A. First report of progress in the anthracite district, southern field, Panther Creek basin. 2d Geol. Surv. Pa. Rept. AA, 1883, 407 pp.
- BOILEAU, J. W. Coal fields of southwestern Pennsylvania, Washington, and Greene Counties. 1907. 90 pp.
- CHANCE, H. M. A revision of the bituminous coal measures of Clearfield County. 2d Geol. Surv. Pa. Rept. H7, 1884, pp. XI-XV.
- HILL, F. A. Geology and mining in the northern coal field of Pennsylvania. Trans. Am. Inst. Min. Eng., vol. 15, 1887, pp. 699-707.
- Report on the anthracite region. Geol. Surv. Pa. Rept. for 1886, pt. 3, 1887, pp. 919-1329.
- LESLEY, J. P. Manual of coal and its topography illustrated by original drawings, chiefly of facts in the geology of the Appalachian region of the United States of North America. 1856. 224 pp.
- Note on classification of coals. 2d Geol. Surv. Pa. Rept. MM, 2d Rept. of progress in the laboratory of the survey at Harrisburg, 1879, pp. 144-157.
- On the Broad Top coal basin in central Pennsylvania. Am. Assoc. Proc., vol. 10, pt. 2, 1857, pp. 78-81.
- The coal beds and fire clays of the Wellersburg basin, in Somerset County, Geol. Surv. Pa. Ann. Rept. for 1885, 1886, pp. 227-239.
- LESQUEREAUX, LEO. On the character and distribution of Paleozoic plants. Geol. Surv. Pa. Ann. Rept. for 1886, 1887, pp. 457-522.
- On the vegetable origin of coal. Geol. Surv. Pa. Ann. Rept. for 1885, 1886, pp. 95-121.
- PLATT, FRANKLIN, and PLATT, W. G. Report of progress in the Cambria and Somerset district of the bituminous coal fields of western Pennsylvania, part 1, Cambria. 2d Geol. Surv. Pa. Rept. HH, 1877, 194 pp.
- Report of progress in the Cambria and Somerset district of the bituminous coal fields of western Pennsylvania. 2d Geol. Surv. Pa. Rept. HHH, 1877, 348 pp.
- ROGERS, H. D. The geology of Pennsylvania. Vol. 1, 586 pp.; vol. 2, 1045 pp. 1858.
- STEVENSON, J. J. Report of progress in the Greene and Washington district of the bituminous coal fields of western Pennsylvania. 2d Geol. Surv. Pa. Rept. K for 1875, 1876, 419 pp.
- WHITE, I. C. Geology of Lawrence County. 2d Geol. Surv. Pa. Rept. QQ, 1879, pp. 1-213.
- Geology of Susquehanna River region in the six counties of Wyoming, Lackawanna, Luzerne, Columbia, Montour, and Northumberland. 2d Geol. Surv. Pa. Rept. G7, 1883, 464 pp.
- Report of the progress of the second geological survey of Pennsylvania in parts of Beaver, Allegheny, and Butler Counties lying north of the Ohio River. 2d Geol. Surv. Pa. Rept. Q for 1875, 1878, pp. 1-273.
- Special report on the correlation of the coal measures in western Pennsylvania and eastern Ohio. 2d Geol. Surv. Pa. Rept. QQ, 1879, pp. 215-303.
- Stratigraphy of the bituminous coal fields of Pennsylvania, Ohio, and West Virginia. U. S. Geol. Surv. Bull. 65, 1891, 212 pp.
- The geology of Mercer County. 2d Geol. Surv. Pa. Rept. QQQ, 1880, 233 pp.

RHODE ISLAND.

- BROWN, C. W. Pre'liminary report of the natural resources survey of Rhode Island. R. I. Bureau Industrial Statistics, Ann. Rept. for 1909, pt. 3, 1910, pp. 59-128. Includes an account of the coal deposits.

TENNESSEE.

- ASHLEY, G. H. The Tennessee coal field. Resources of Tennessee, vol. 1, October, 1911, pp. 188-202.
- GLENN, L. C. The general features of the Tennessee coal field north of the Tennessee Central Railroad. Tennessee State Geol. Survey, Resources of Tennessee, vol. 3, No. 1, January, 1913, pp. 4-25. (Also published in Bulletin 2-B.)
- NELSON, W. A. The Tennessee coal field south of the Tennessee Central Railroad. Tennessee State Geol. Survey, Resources of Tennessee, vol. 3, No. 1, January, 1913, pp. 26-49. (Also published in Bulletin 2-B.)
- PHALEN, W. C. Preliminary report of the coal resources of the Pikeville special quadrangle of eastern Tennessee. Resources of Tennessee, vol. 1, September, 1911, pp. 117-162.

TEXAS.

- ASHBURNER, C. A. Brazos coal field, Texas. Trans. Am. Inst. Min. Eng., vol. 9, 1881, pp. 495-506.
- DRAKE, N. F. Report on the Colorado coal field of Texas. Tex. Geol. Surv. 4th Ann. Rept., 1893, pp. 357-446.
- DUMBLE, E. T. Report on the brown coal and lignite of Texas. Tex. Geol. Surv. 1892, pp. 17-243. Describes the origin, formation, and characters of brown coal, the geology of the Texas deposits, and the occurrence and composition of the Tertiary brown coals in the different States, and compares them with European brown coals.
- PHILLIPS, W. B. Coal, lignite, and asphalt rocks [Texas]. Tex. Univ. Mineral Surv. Bull. 3, 1902, pp. 137.
- The coal, lignite, and asphalt rocks of Texas. Western Soc. Engrs. Jour., vol. 9, 1904, pp. 571-592.
- PHILLIPS, W. B., and WORRELL, S. H. The composition of Texas coals and lignites. Tex. Univ. Bull., Sci. Ser. No. 19, 1911, pp. 5-57.
- SIMONDS, F. W. The minerals and mineral localities of Texas. Tex. Univ. Min. Surv. Bull. 5, 1902, pp. 3-95.
- UDDEN, J. A. A sketch of the geology of the Chisos country, Brewster County, Texas. Univ. of Texas Bull. 93, Apr. 15, 1907, 101 pp.

UTAH.

- HARRINGTON, D. Coal mining at Sunnyside, Utah. Colo. Sch. Mines Bull., vol. 1, 1901, pp. 227-235. Describes the general geology, the occurrence of the coal in the Laramie group, and the mining operations.

VIRGINIA.

- BACHE, FRANKLIN. Coal sections developed by recent operations in Wise County, Virginia. Trans. Am. Inst. Min. Eng., vol. 24, 1895, pp. 70-80. Describes the coal developments and gives sections from various parts of the coal area of the country.
- BOYD, C. R. Correlation in the coal rocks west of Pocahontas, Flat Top, Virginia. Trans. Am. Inst. Min. Eng., vol. 24, 1895, pp. 254-257. Remarks on the occurrence of a conglomerate overlying the coal in this region and its bearing on the correlation of the coals.
- HODGE, J. M. The Big Stone Gap coal field. Trans. Am. Inst. Min. Eng., vol. 21, pp. 922-938 and 1005-1006.
- LESLEY, J. P. The geological structure of Tazewell, Russell, and Wise Counties in Virginia. Am. Phil. Soc. Proc., vol. 12, 1873, pp. 489-513.
- WATSON, T. L. Mineral resources of Virginia. Va. Jamestown Exposition Commission, Lynchburg, 1907, 618 pp. Includes analyses of coals.

WASHINGTON.

- EVANS, G. W. The coal fields of King County. Wash. Geol. Surv. Bull. 3, 1912, 247 pp.
- LANDES, HENRY. The coal deposits of Washington. Wash. Geol. Surv. Ann. Rept. for 1901, vol. 1, 1902, pp. 257-281.
- LANDES, HENRY, and RUDDY, C. A. Coal deposits of Washington. Wash. Geol. Surv. Ann. Rept. for 1902, vol. 2, 1903, pp. 165-277. Describes character, geographic distribution, and geologic relations of the Washington coal beds, the occurrence, thickness, and value of the coal seams, and the constitution and value of the coals.

WEST VIRGINIA.

- GRIMSLEY, G. P. Report on the geology of the Panhandle counties of West Virginia. W. Va. County Repts. and Maps: Ohio, Brooke, and Hancock Counties, 1907, 378 pp.
- GRISWOLD, W. T. The coals of the Steubenville quadrangle in West Virginia. W. Va. Geol. Surv. County Repts. and Maps: Ohio, Brooke, and Hancock Counties, 1907, pp. 224-237.
- HENNEN, R. V. Marshall, Wetzel, and Tyler Counties [W. Va.]. W. Va. Geol. Surv. County Repts., 1909, 654 pp. Describes the area mentioned and the mineral resources, including coal.
- Wirt, Roane, and Calhoun Counties. W. Va. Geol. Surv., 1911, 573 pp.
- HENNEN, R. V., and REGER, D. B. [Report on the history and physiography, geology, and mineral resources of] Marion, Monongalia, and Taylor Counties. W. Va. Geol. Surv., 1913, 844 pp.
- KREBS, C. E., and TEETS, D. D., Jr. Cabell, Wayne, and Lincoln Counties [W. Va.]. W. Va. Geol. Surv., County Repts., 1913, 483 pp.
- RAMSAY, G. S. The northeastern bituminous coal measures of the Appalachian System. Trans. Am. Inst. Min. Eng., vol. 25, 1896, pp. 76-83.
- ROBINSON, NEIL. The Kanawha and New River coal fields of West Virginia, U. S. A., 1904, 23 pp. Includes notes on the occurrence, geologic relations, composition, fuel values, and production of coal.
- WEEKS, J. D. The Elk Garden and Upper Potomac coal fields of West Virginia. Trans. Am. Inst. Min. Eng., vol. 24, 1895, pp. 351-364. Gives a general description of the region and tables of chemical analyses of the coal and of coal production.
- WHITE, I. C. Levels. Coal analyses. W. Va. Geol. Surv. Bull. 2, 1910, 385 pp.
- Shortage of coal in the northern Appalachian coal field. Geol. Soc. of America Bull., vol. 20, 1909, pp. 333-340. Discusses the distribution of workable beds, the method of deposition of the coal, and the duration of the field under present methods of mining and use.
- Supplementary coal report. W. Va. Geol. Surv., vol. 2 (A), 1908, 720 pp. A detailed account of the distribution, geologic relations, and economic value of the coal beds of West Virginia.
- The Appalachian coal field [West Virginia]. W. Va. Geol. Surv., vol. 2, 1903, pp. 81-716. Gives a detailed account of the Carboniferous system in West Virginia, including geologic sections, the extent, character, and geologic position of the various formations, and the character, occurrence, constitution, and fuel value of the coals.

WYOMING.

- KNIGHT, W. C. Coal fields of southern Uinta County, Wyo. Abstract: Geol. Soc. Am. Bull., vol. 13, 1903, pp. 542-544. Describes briefly the Cretaceous strata of the region and gives chemical analyses of the coals.
- TRUMBULL, L. W. A preliminary report upon the coal resources of Wyoming. Wyo. Univ. School of Mines Bull. 7, 1905, 19 pp.

PUBLICATIONS ON FUEL TECHNOLOGY.

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INDEX.

This index gives the names of places at or near which the samples of coal mentioned in this bulletin were collected. In addition, it gives the names of many coal beds, including names of geological significance as well as some that are merely local, and the names of most of the mines.

Attention is called to the fact that many beds opened by prospect pits, country banks, or even mines, especially beds in the Rocky Mountain province, have no names, even local ones. Moreover, such local names as "A," "B," "1," "2," "Upper," "Lower," have been omitted in the case of beds that have not been correlated with other beds similarly designated in the same State, the purpose in omitting such names being to reduce the length of the index and to avoid the confusion that would result from applying the same designation to different beds. Mines that in the text have no other title than a number, as "Mine No. 1," are not included, for the same reasons.

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